Environment Canada Environnement Canada

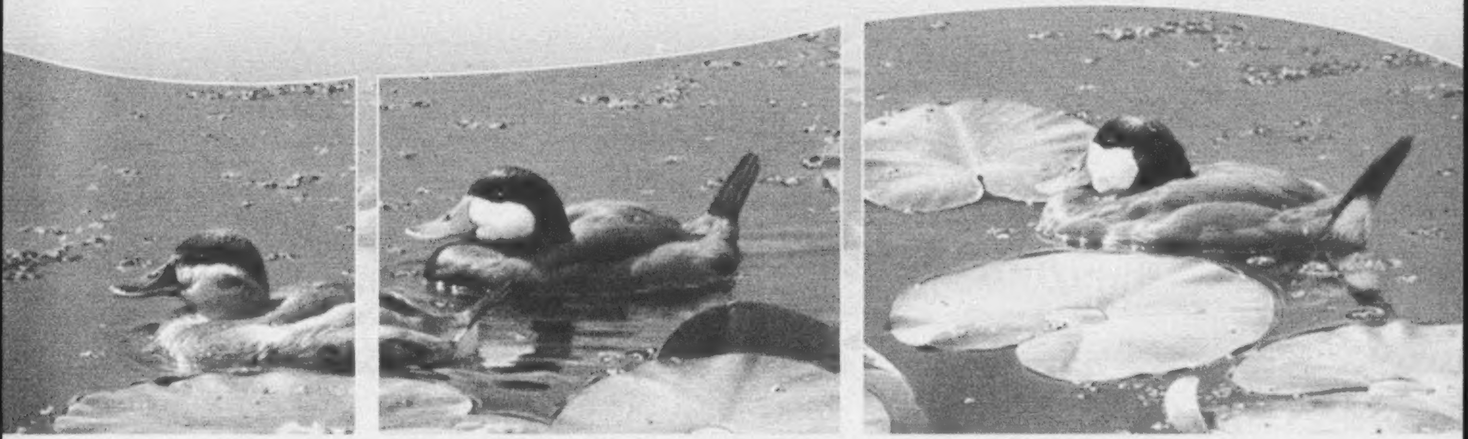
Population Status of Migratory Game Birds in Canada

(and Regulation Proposals for Overabundant Species)

November 2008

Canadian Wildlife Service
Waterfowl Committee

CWS Migratory Birds Regulatory Report Number 25



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November 2008

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CWS Migratory Birds Regulatory Report Number 25

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Comments:

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Background

Canadian hunting regulations for migratory game birds are reviewed annually by Environment Canada, with input from the provinces and territories and a range of other stakeholders. As part of this process, the Canadian Wildlife Service (CWS) of Environment Canada produces three reports each year. The November report, *Population Status of Migratory Game Birds in Canada*, contains population and other biological information on migratory game birds and provides the scientific basis for management. The December report, *Proposals to Amend the Canadian Migratory Birds Regulations,* outlines the proposed changes to the annual hunting regulations, as well as other proposed amendments to the *Migratory Birds Regulations*. These two documents are distributed to organizations and individuals with an interest in migratory game bird conservation, to provide an opportunity for input to the development of hunting regulations in this country. The third report, *Migratory Bird Regulations in Canada*, issued in July, summarizes the hunting regulations for the upcoming hunting season. It also presents information on other regulatory proposals.

Data presented in the November report come from a variety of sources. Breeding population estimates and trends for inland ducks are derived from large-scale systematic aerial surveys conducted annually in eastern and western Canada and parts of the United States. Additional small-scale, usually annual, breeding waterfowl surveys are also conducted in other parts of this country. Information on sea duck populations comes mainly from surveys limited to a few key locations or a small portion of the species' range, and conducted during the breeding, moulting or overwintering period. Goose population estimates and trends are derived mainly from specific annual or occasional surveys carried out during the breeding season or, in some cases, during migration. Additional information on waterfowl populations is also provided by mid-winter surveys on the wintering grounds conducted annually in the four U.S. flyways. Population information on swans and other migratory game birds is derived from specific breeding or wintering surveys or countrywide breeding bird surveys. Harvest levels of migratory game birds in Canada and the United States are estimated through national harvest surveys and, in some cases, through species-specific surveys. From 1961 through 2001, estimates of waterfowl harvest in the U.S. were derived from the U.S Fish and Wildlife Service's Waterfowl Questionnaire Survey. However, a new survey, the Harvest Information Program (HIP), was fully implemented in 1999. In addition to waterfowl, it gathers information on species and groups of migratory game birds such as woodcock, doves and snipe. Since both the sources of the information and the questionnaires used are different, harvest estimates yielded by the two surveys can not be directly compared. The data are currently being evaluated to understand the resulting differences in harvest estimates.

Population Status of Inland Ducks

Eastern Canada

In Eastern Canada, breeding waterfowl populations are monitored annually through the Eastern Waterfowl Breeding Ground Survey (hereafter Eastern Waterfowl Survey). The Canadian Wildlife Service carries out a systematic helicopter survey over the Boreal Shield region from northeastern Ontario to Newfoundland and Labrador, and the Atlantic Highlands region from the Gaspé Peninsula in Quebec to Nova Scotia. The U.S. Fish and Wildlife Service conducts a fixed-wing aerial survey in parts of Eastern Canada and the northeastern U.S. (Figure 1). This work has been evolving since 1990, originating as part of the Black Duck Joint Venture of the *North American Waterfowl Management Plan* (NAWMP). The surveys are designed and timed primarily to provide reliable breeding population estimates and trends for the American Black Duck, an early-nesting species.

Historically, the data from these surveys have been analyzed separately, despite some overlap in geographic coverage. In 2004, the CWS and the USFWS agreed to integrate the two surveys to reduce the extent of overlap and expand the geographic region covered. The data presented in this report now represent an integration of the results of the two survey platforms. In time, all survey results will be integrated for reporting on a regional basis.

Additional breeding population surveys are also conducted in some parts of Eastern Canada although they are presently not included in the integrated Eastern Waterfowl Survey. On Prince Edward Island, an annual breeding waterfowl survey of ground plots has been in place since 1985 and conducted cooperatively by the CWS and the P.E.I. Fish and Wildlife Division. In southern Ontario, a breeding waterfowl survey of ground plots has been conducted by the CWS at three- to five-year intervals since 1971. In 2005 it was changed to an annual survey employing a rotating sample of the original plots. In 2008 the first four year rotation was completed. Finally, beginning in 2004, surveys along the St. Lawrence River shoreline and in the lowlands of southern Quebec were added to assess the value of these areas to breeding waterfowl on a regular basis.

In this section, we summarize information on inland duck populations in Eastern Canada.

American Black Duck

There is some concern over American Black Duck (*Anas rubripes*) populations in North America. Mid-winter inventories in the Atlantic and Mississippi flyways have shown a decline in the continental population between 1955 and the early 1980s, when numbers stabilized at a low level (Figure 2). In 2008, numbers in the Atlantic Flyway (259 626) rose sharply compared to recent years and reached a level not seen since 2002. In the Mississippi Flyway, the estimate (271 209) was similar to those of recent years.

Historically, surveys of American Black Ducks on their wintering areas are useful for studying overall population trends, but they are not very effective for evaluating the status of breeding populations, because of the mixing of birds from diverse breeding areas. In the area covered by the Eastern Waterfowl Survey, the integrated index of the number of indicated breeding American Black Ducks is shown in Figure 3. Trends appear to be relatively stable for most survey strata, and the overall survey area.

The long-term decline in the counts of American Black Ducks in mid-winter inventories is paralleled by a decline in the number of indicated breeding pairs observed during ground counts of breeding waterfowl in southern Ontario, particularly between 1971 and 1998 (Table 1). At the same time, a significant increase in Mallards more than compensated for the decline in American Black Ducks in the survey area.

The decline of American Black Ducks on their wintering grounds prompted the United States to initiate a program to reduce the harvest of the species in 1983; Canada joined the initiative in 1984. Between 1984 and 1988, the harvest in the U.S. gradually decreased, while it remained relatively the same in Canada (Table 2). In 1989 and 1990, however, Canada successfully implemented more rigid black duck hunting restrictions in order to protect local breeding populations. The 2007 harvest estimate was 103 811 ducks, about the average taken in each of the previous five years. The estimated continental harvest in 2007 was 241 208 black ducks, an increase of around 3% over 2006. This increase is due mainly to the increase in the harvest in the United States, as the harvest in Canada decreased between 2006 and 2007 (Table 2). The continuing general trend of decreasing harvest in Canada is thought to be at least partly related to a decline in the number of hunters.

Other Inland Duck Species

The Eastern Waterfowl Survey of Eastern Canada, though originally designed to survey Black Ducks, provides quantitative information on other inland duck species that can be used to evaluate the status of their breeding populations. The range-wide integrated indices for the number of indicated breeding birds of the most abundant eastern species are plotted in figures 4a to 4c.

Overall in 2008, Mallard and Green-winged Teal numbers were similar to 2007 whereas the Ring-necked Duck populations showed a marked decline (figures 4a through 4c). Mallards (*Anas platyrhynchos*) continue to exhibit increasing trends, with the Atlantic Highlands seeming to have the highest rate of increase. Although the Atlantic Highland population sub-unit represents a small proportion of overall Mallard numbers in the Eastern Waterfowl Survey area, the trend trajectories in the area seem to be higher in general for all four species analysed (Black Duck, Mallard, Green-winged Teal and Ring-necked Duck), and lowest in the Western Boreal Shield. Green-winged Teal (*Anas crecca*) and Ring-necked Ducks (*Aythya collaris*) also continue to do well.

Results of the ground-based breeding waterfowl survey in southern Ontario are graphed in Figures 5a and 5b for the more common species encountered. Trend estimates (Table 1) are also presented for both the 1971-2008 and 1992-2008 periods. These document the long-term declines of both American Black Ducks and Blue-winged Teal to very low numbers in the southern Ontario survey area. Wood Ducks show a fairly steady increase to become the second most abundant duck species there. The most abundant species, the Mallard, rose in numbers up until 1984 after which they remained essentially stable. Numbers of Green-winged Teal, and Common Mergansers may have increased slightly in the long-term but counts are highly variable as are those of Hooded Mergansers which shows no long-term trend. The 2008 results for most species are within the range of those for the previous recent years except for the Green-winged Teal whose count was abnormally high.

Canadian Prairies and Western Boreal Canada

Breeding waterfowl populations are monitored annually through the Waterfowl Breeding Population and Habitat Survey (U.S. Department of the Interior and Environment Canada 1987). The traditional survey area encompasses the Canadian Prairies and Western Boreal Canada (northwestern Ontario to Old Crow Flats in the Yukon), as well as the north-central United States (U.S. Prairies) and parts of Alaska (Figure 6). The U.S. Fish and Wildlife Service (USFWS) and the CWS have been conducting this survey, using fixed-wing aircraft in combination with ground counts, since 1955. Breeding population estimates have been corrected for visibility bias since 1961.

In this section, we summarize information on inland duck populations in the Canadian Prairies and Western Boreal Canada. Summaries of the results by province and territory can be found in Caswell and Schuster (2008).

Breeding Habitat Conditions in the Prairie Pothole Region

In the Prairie Pothole Region (Canadian and U.S. Prairies; see Figure 6), weather has a strong influence on waterfowl breeding habitat conditions and, consequently, on the abundance of waterfowl populations. Drought in the late 1980s and early 1990s created particularly difficult breeding conditions for ducks. Spring habitat conditions (as measured by the number of ponds in May) improved into the late 1990s from the drought levels of the late 1980s and early 1990s (Figure 7). The May 2008 estimate of 4.4 ± 0.2 million ponds was 37% lower than last year's estimate (USFWS 2008a).The 2008 value for the Prairie Pothole Region was 10% lower than the long-term average. An analysis of trends showed significant increases ($p < 0.05$) in the number of ponds in the Canadian Prairie Pothole Region during the last ten years (1999-2008), however, the increasing trend over the short term is not significant (Table 3). The long-term declining trend for the Canadian Prairies is not significant and remains the same as what had been observed up to 2007; wide annual and short-term fluctuations in numbers have been driving changes in short-term trends, however the long-term trends remain unchanged.

Mallard

The Mallard breeding population in the traditional survey area had recovered from the decline seen in the 1980s, but in 2001, for the first time in five years, it dropped below the NAWMP goal of 8.20 million (Figure 8), and remained there until 2007. However, in 2008 the Mallard breeding population index in the traditional survey area once again dropped below the NAWMP goal to 7.7 million birds, a decrease of 7% compared to 2007. Trends indicate a significant decline during the last 10 years, the long term and short term trends are both positive and not significant (Table 3).

Compared to 2007, the Canadian Prairie breeding population decreased by 6% in 2008 to 3.2 million birds (Caswell and Schuster 2008) (Figure 8). The ten-year trend continues to show a decline, however it is no longer significant, and the five-years trend is increasing significantly ($p < 0.005$) (Table 3). In Western Boreal Canada, the Mallard breeding population was up by 22% over the previous year, with an estimated 2.15 million birds (Figure 8). The long term and ten year trends are declining and the five year trend is increasing, however none of these trends are significant (Table 3). The population numbers have been highly variable, undergoing rapid fluctuations over the past 40 years (Figure 8).

The continental harvest of Mallards during the last several years increased considerably compared to the late 1980s and early 1990s (Table 4), reflecting the large growth in this population. This increase in harvest has occurred entirely in the U.S., whereas harvest levels have stabilized in Canada. In 2007, it is estimated that 4.9 million Mallards were killed in the U.S., an increase of 5% from the previous year. In 2007 in Canada, the estimated harvest decreased by 11% compared to 2006 to about 546 000. Overall, when compared to 2006, the continental harvest of Mallards increased by 3% to 5.4 million birds.

Northern Pintail

Following the dramatic decline in abundance in the 1980s, the breeding population of Northern Pintail (*Anas acuta*) in the entire traditional survey area showed signs of recovery, increasing to 3.6 million birds by 1997 (Figure 9). Thereafter, pintail numbers again declined, reaching a historic low in 2002. In 2006 the population returned to the 1997 level, where it remains in 2007, with an estimated 3.3 million birds. However in 2008 the population declined by 22%, relative to 2007, to an estimated 2.6 million birds. Even with the increases seen between 2002 and 2007 the population size continues to be far below the NAWMP goal of 5.60 million birds (Figure 9). The status of this species is the focus of NAWMP's Northern Pintail Action Group, which hopes to identify and mitigate the key factors driving the declining trend.

During the 1970s, the Canadian Prairies supported about half of the pintails in the traditional survey area. The decline of that region's breeding population has therefore had major repercussions for the size of the continental breeding population, and has been compounded by declines in the smaller populations of the U.S. Prairies and Western Boreal Canada (Figure 9). Long-term population declines in all three regions are significant ($p < 0.05$, Table 3), as is the long-term decline for the entire traditional survey area. Alaskan pintails remain the only population component not demonstrating a long-term decline in numbers (Table 3).

In the Canadian Prairies, estimates were 15% below the ten-year average and 58% below the long-term average (Caswell and Schuster 2008). Table 3 shows that the population has experienced a significant average long-term decline of 2.9% per year ($p < 0.05$). In contrast, there has been a significant increase of 5.1% per year over the past decade. The 2007 estimate of 1.3 million birds in Prairie Canada was far below the NAWMP population goal of 3.30 million, and 2008 numbers were 47% lower, with an estimated 690 000 birds. This decrease was driven by declines in numbers in Southern Prairie Canada where numbers declined 47%, compared to 2007, in Northern Prairie Canada numbers increased by 40% between 2007 ans 2008 (Caswell and Schuster 2008). In Western Boreal Canada, Northern Pintail numbers increased by 41% in 2008 to 372 000 birds (Figure 9), the long-term trend indicates a significant decline, however the short term trend indicates a significant increase ($p < 0.05$) (Table 3). Currently this population also remains well below the regional NAWMP goal of 407 000 pintails.

The total annual harvest of Northern Pintails dropped with the population decline that began in the 1980s. The continental harvest gradually rose during the mid-1990s (Table 5), reflecting the increase in estimated pintail numbers during the same period. Between 1999 and 2004 the estimated numbers of birds harvested was declining. Since then, harvest numbers have been increasing every year, from 366 000 in 2004 to 586 000 in 2007. This increase was driven by increases in US harvest, from 2004 to 2007 the harvest increased by 73%, the estimated harvest in 2007 was 529 000 birds. In Canada, the harvest remained relatively stable between 2004 and 2007, however numbers were lower in 2005 and 2006 relative to both 2004 and 2007. For 2007 the estimated harvest in Canada was 57 000 birds (Table 5).

Other Dabbling Ducks

Other dabbling duck species monitored under the Waterfowl Breeding Population and Habitat Survey are Blue-winged Teal (*Anas discors*), Gadwall (*A. strepera*), Green-winged Teal (*A. crecca*), American Wigeon (*A. americana*), and Northern Shoveler (*A. clypeata*). Between 2007 and 2008, the overall abundance of Blue-winged Teal and Green-winged teal remained relatively stable (Figures 10 and 12), Gadwall and American Wigeon decreased (Figures 11 and 13) while Northern Shovelers increased (Figure 14). All species but the American Wigeon show significant, positive long-term trends (Table 3); the long-term trend for the Wigeon is not significant, and this species is the only one of the four not currently at or above its NAWMP population goal (figures 10 to 14).

On the Canadian Prairies, Blue-winged Teal, American Wigeon and Northern Shovelers showed increases compared to last year (Figures 10, 13 and 14) while Gadwall and Green-winged Teal numbers declined, compared to 2007 (Figures 11 and 12). For Green-winged Teal, these declines were offset by increases in the other survey strata, however for Gadwall the population also decreased from 2007 to 2008 on the US Prairies and throughout the entire survey area (Figure 11).

American Wigeon increased in 2007 for the first time since 1997, approaching the continental NAWMP goal of 2.97 million birds, however in 2008 the population dropped by 11% from 2007 to an estimated 2.5 million birds (Figure 13). The most significant decline has taken place in the Canadian Prairies, where this species has sustained an average decline of 2.4% per year (Table 3). Currently the Canadian Prairie population isincreasing, the five year trend indicates a significant increase of 16.7% (Table 3). However, overall numbers in the Canadian Prairies remain well below those seen in the 1970s and early 1980s and the population continues to be at less than half of the NAWMP goal (Figure 13).

Scaup

Lesser Scaup (*Aythya affinis*) and Greater Scaup (*A. marila*) are not treated separately in the Waterfowl Breeding Population and Habitat Survey because they are difficult to differentiate from fixed-winged aircraft. Nonetheless, Lesser Scaup is the much more abundant species (Austin et al. 1999). Scaup breeding populations are in decline in the traditional survey area (Figure 15), with significant ($p < 0.05$) declines in breeding numbers observed over the long term (Table 3). In 2008 the continental scaup population was estimated at 3.7 million birds; which is below the NAWMP goal of 6.30 million.

The combined population size of Lesser and Greater scaup in Western Boreal Canada accounts for just less than half of the continental total. The declining trend for the entire traditional survey area is largely a reflection of significant reductions in the Western Boreal region's breeding population (Figure 15; Table 3). At 2.1 million birds estimated in 2008, the number of scaup in Western Boreal Canada remains well below the NAWMP population goal of 4.3 million birds and it is declining by 1.5% every year (long-term decline; Table 3). The scaup breeding population in the Canadian Prairies is currently less than half the size it was in the 1970s and has declined, on average 0.9% per year since 1961 (Figure 15; Table 3). However, the trend in numbers has been positive in recent years.

The reasons for the decline in Scaup breeding populations are not known. Concerns over the abundance of scaup populations prompted the U.S. Geological Survey's Northern Prairie Wildlife

Research Center to host workshops in September 1998, with a follow-up in January 2006, to provide biologists the opportunity to share information and discuss research needs and opportunities for collaboration.

The harvest of Lesser and Greater scaup has declined considerably in Canada over time (tables 6 and 7), possibly reflecting the decline in scaup populations. In 2007, the Canadian harvest of Lesser and Greater scaup was estimated at 30 783 and 8 672 birds, respectively. The harvest of Lesser Scaup declined by 4% compared to 2006, whereas the harvest of Greater Scaup remained similar to 2006.The scaup harvest has been quite variable in the U.S. (tables 6 and 7). Sharp declines were observed in the late 1980s and early 1990s, but the harvest increased considerably from 1994 to 1998. The 2007 harvest of Lesser Scaup in the U.S. (223 440 birds) was down 4% compared to 2006. The Greater Scaup harvest has also declined over the years in the U.S., except for the substantial increases in 2002 and 2004. The estimated harvest was 70 833 birds in 2007 or 48% higher than in 2006, and well above the average harvest estimate of 52 461 killed per year since 1999. The continental harvest of Lesser Scaup fell by 4% to 254 223 in 2007 and increased by 41% for Greater Scaup to 79 505 birds.

At a period when breeding populations of scaup were relatively large (1975–79), the mean harvest rate index (harvest/breeding population size) in Canada was 2%, for Lesser Scaup and approximately 13% for Greater Scaup. In 2008, the harvest rate index in Canada for both species was down to about 1%. In the U.S., the mean harvest rate index for Lesser Scaup in the late 1970s was about 8%, declining slightly to about 7% by 2008. Similarly, the harvest rate index for Greater Scaup declined from about 17% in the late 1970s to just 10% in 2008.

Other Diving Ducks

The other diving duck species monitored as part of the Waterfowl Breeding Population and Habitat Survey are the Canvasback (*Aythya valisineria*), Redhead (*A. americana*), Ring-necked Duck (*A. collaris*), and Ruddy Duck (*Oxyura jamaicensis*).

For the Canvasback, short-term significant trends are for a steep decline (22% per year) in Alsaka and an increase (11%) in the Canadian Prairies (Table 3). Overall, numbers in recent years are up compared to the 1980s but have fluctuated widely between years (Figure 16). At 488 667, this population is slightly below the NAWMP goal of 541 868 (Figure 16).

The Canadian harvest of 12 421Canvasbacks in 2007 was higher than the previous year and represents a third consecutive year over 10 000 (Table 8). The harvest in the U.S. has varied over the long term; the 2007 harvest of 125 207 birds was 38% higher than the number estimated in 2006. The variable trend in Canvasback numbers can also be seen in Redhead trends (Figure 17). The current count of 1.1 million birds is similar to the number estimated last year (Figure 17); all significant trends are positive (Table 3). Redhead populations are above the NAWMP goals in every stratum.

The Ring-necked Duck population shows an increasing trend of 2.7% per year over the long term (Table 3; Figure 18). Ruddy Ducks are also doing well, with a significant increasing trend of 2% per year over the long term trendin the traditional survey area (Table 3; Figure 19).

Southern Yukon

The southern Yukon is surveyed through the Cooperative Roadside Waterfowl Breeding Population Survey (Hawkings and Hughes 2008). This year was the 18th year of this cooperative waterfowl survey. A total of 282 wetlands were surveyed at least once along the road system in the southern Yukon. Of these, 217 were surveyed five times during the same five-week period in both 2007 and 2008. Beginning in 2004, surveyors were asked to record six additional species: Rusty and Red-winged blackbirds, Solitary Sandpiper, Lesser Yellowlegs, Wilson's Snipe, and Sora. Although local population trend information on these species is lacking, there is evidence that four of these species are declining continentally.

In 2008, the total number of all waterfowl (ducks, geese, swans, loons and grebes) fell by 4% to 1 435 birds and indicated breeding pairs fell by 9% compared to 2007 values (Hawkings and Hughes 2008). The total number of dabbling ducks decreased by 1% and indicated pairs of dabblers fell by 3%. The total number of diving ducks decreased by 15% and indicated pairs of divers also declined by 17% in comparison to last year. Indicated breeding pairs of dabblers and divers are now at 58% and 35% of 1991 levels, respectively. Breeding pairs of most common duck species decreased in 2008 (figures 20, 21 and 24). Similarly, decreased numbers of dabblers (-11%) and divers (-1%) were observed during the USFWS aerial survey of Alaska and northern Yukon (Mallek and Groves 2008).

Interior British Columbia

Snowpack conditions were at near-normal levels across the B.C. Interior during the winter of 2007–2008. Water levels on low-elevation wetlands were similar to those of 2007 across the Interior but below the 1996-2007 average. April was very cold across the region (one of the coldest April in the last 50 years), which delayed the spring snow melt and resulted in a substantial number of mid- and low elevation wetlands being frozen in early May.

Breeding habitat conditions were overall similar to those of May 2007: poor in the Southern and Central Interior and good in the Northern Interior. Two major surveys have been used to estimate trends in duck populations in British Columbia: a large-scale (11 million hectare) aerial survey of the B.C. Interior and a replicated series of ground counts covering selected wetlands of the Southern and Central Interior Plateau of B.C. Because of funding constraints and in response to changing program demands, ground counts were modified in 2007 to focus on managed and protected wetlands. Ground count results can no longer be used as a long-term index of duck abundance in the B.C. Interior and they are not reported here.

Aerial surveys of breeding waterfowl were conducted in the Central Interior Plateau of British Columbia in May 2006, 2007 and 2008 over an area in excess of 10 million hectares. The survey used a strip-transect total count method similar to the one used for the mid-continent breeding waterfowl survey, although all waterfowl sightings are geo-referenced and associated with a unique habitat type (i.e. stream, wetland, river, lake, agricultural field) and ecological unit (ecosection) to allow for the subsequent determination of ecosystem-specific, habitat-to-species relationships and the development of landscape use models. Waterfowl population estimates are calculated separately for each ecosection and also for the entire survey area. We estimated the presence of 408 028 breeding waterfowl in the surveyed portion of the B.C. Interior in May 2008, with Mallard being the most abundant species (20% of the total). This is 32% lower than the 537 888 breeding waterfowl estimated in May 2007.

Population Status of Sea Ducks

There is concern about the population status of most of the sea duck species (tribe *Mergini*) that breed in North America. Because many breed at low densities in remote parts of the continent and cover a broad geographic area, it is difficult to gather adequate information on their ecology and population dynamics. Consequently, sea ducks are poorly known and few reliable population indices or estimates of annual productivity exist for any of the species. Harvest levels are also poorly understood. In comparison to other waterfowl, sea ducks have low reproductive rates, which means that population maintenance is highly sensitive to adult mortality. There is therefore limited potential for quick population recovery. Because of increasing concern about the status of sea ducks, the NAWMP Committee created the Sea Duck Joint Venture (SDJV) in 1998. The SDJV recently undertook a review of monitoring needs for sea ducks and made recommendations regarding the development and testing of various surveys (see http://www.seaduckjv.org/). As an example, starting June 2005 a fixed-wing aerial survey was conducted annually in parts of central and western arctic Canada (Conant et al. 2007). The survey followed a design of systematically placed transects in areas of known or suspected high densities of waterfowl and waterbirds (Cornish and Dickson 1996; Hines et al. 2003; Alisauskas 2005). Provided adequate funding can be obtained, this will become an annual survey, thus improving utility of the survey to detect trends in King Eiders, Long-tailed Ducks, and several other arctic waterfowl species.

Harvest information is estimated through the national harvest survey programs in Canada and the United States. However, harvest estimates are imprecise for many sea duck species due to small sample sizes and the current inability to collect data on the late season (i.e. winter) harvest.

Eiders

Reviews by Suydam (2000), Gilchrist and Dickson (1999), and Dickson (1996; 1997) provide useful summaries of what is known about eider species that breed in Canada, i.e. the King Eider (*Somateria spectabilis*) and Common Eider (*S. mollissima*).

King Eiders nesting in the Canadian Arctic overwinter in both the eastern and western parts of the continent. Since King Eiders form pairs on the wintering areas, there may be two distinct populations, although genetic differences have not been identified to date (Pearce et al. 2004). For Common Eiders breeding in northern Canada, three subspecies are recognized: the Pacific subspecies *Somateria mollissima v-nigra* (western and central Arctic), the northern subspecies *borealis* (eastern Arctic), and the Hudson Bay subspecies *sedentaria* (Hudson Bay and James Bay). A fourth race, the American subspecies *dresseri*, breeds in Quebec and the Atlantic provinces.

King Eider

Western Arctic Population

There is growing evidence that the western Arctic population of King Eiders has declined considerably in the last few decades. Spring counts of eiders migrating past Point Barrow, Alaska, indicate that the King Eiders breeding on the Arctic coastal plain of Alaska and in the western and central Canadian Arctic declined by more than 50% between 1976 (800 000 birds) and 1996 (350 000) (Suydam 2000). Aerial surveys conducted in the western Canadian Arctic in 1991–94, together with the work by Alisauskas (1992) in the Queen Maud Gulf, have provided a breeding population estimate of about 200 000 to 260 000 King Eiders in the western and central Canadian Arctic (Dickson et al. 1997). This estimate is considerably lower than the estimate of 900 000 by Barry (1960) 40 years earlier, which suggests a substantial decline in the abundance of the western Arctic population (Dickson et al. 1997). The breeding population surveys conducted on western Victoria Island in 1992–94 were repeated in 2004–2005. Results indicate that King Eiders in that part of their breeding area declined by an additional 50% during the past decade (Raven and Dickson 2006). Reasons for the decline are unknown.

Movement between nesting, moulting and wintering areas has been documented for 42 King Eiders tagged with satellite transmitters on Victoria Island and Banks Island, N.W.T., and Prudhoe Bay, Alaska. The results show the majority of western King Eiders moult and winter off the east coast of Russia (L. Dickson, pers. comm.). King Eiders banded in the central Arctic, in the Queen Maud Gulf, have been recovered near Alaska as well as near Greenland (R. Alisauskas, pers. comm.).

Nearly all (99%) of the western Arctic eiders harvested in Canada are taken near the community of Holman on western Victoria Island, N.W.T. (Fabijan et al. 1997). A three-year study was conducted at Holman to further our understanding of the impact of the town's subsistence harvest on the area's eider subpopulations. Hunters from Holman harvested an estimated 4–7% of the King Eider subpopulation and less than 1% of the Common Eider subpopulation available to the community. The present levels of harvest at Holman are likely sustainable. However, more information on recruitment rates and mortality, including harvest in Russia, is needed to confirm this (L. Dickson, pers. comm.).

Eastern Arctic Population

A review of available data on the wintering grounds in Greenland has shown a substantial decrease in the numbers of wintering and moulting King Eiders and suggests that the eastern Arctic population is declining. It is not known if this apparent decline represents a shift in distribution due to human disturbance (Suydam 2000). In the Rasmussen Lowlands of Nunavut, however, a significant decline in the numbers of King Eiders was seen between 1974–75 and 1994–95 (Gratto-Trevor et al. 1998). These findings support the concerns expressed by hunters in the area that numbers are declining (Johnston et al. 2000).

In the eastern Arctic, available harvest data for eiders is limited. However, the harvest of eiders (King and Common eiders combined) in southwest Greenland is estimated at over 100 000 birds annually. A large proportion of this harvest consists of Canadian breeding birds, since the breeding population of Common Eiders in western Greenland is likely only 20 000 pairs, based upon recent surveys (G. Gilchrist, pers. comm.).

Pacific Common Eider

Migration counts at Point Barrow provide evidence pointing to a considerable decline in the population of Pacific Common Eiders in recent years. Counts during spring migration show a decline of more than 50% between 1976 and 1996 (Suydam et al. 2000). Reasons for the decline are unknown.

Surveys during spring migration in the late 1980s suggested that more than half of the Pacific Common Eiders that breed in Canada nest in Dolphin and Union Strait, Coronation Gulf, and Queen Maud Gulf (Hoover and Dickson 2007). To document the size and location of nesting colonies, provide a breeding population estimate for the region, and establish a baseline for monitoring Pacific Common Eider populations in future, aerial and ground surveys were conducted over three years beginning in 1995. The breeding population for the central Arctic was estimated at about 37 000 and the primary nesting areas were identified as southeastern Dolphin and Union Strait, outer Bathurst Inlet, Melville Sound, Elu Inlet and central Queen Maud Gulf (L. Dickson, pers. comm.).

Aerial surveys in late June in Bathurst Inlet area were conducted in 1995, then again in 2006-2008 to establish a baseline for monitoring Pacific Common Eider breeding population trends (Raven and Dickson 2008). At a subset of 24 colonies in the same area, nest success and annual survival of adult females were monitored over a seven year period starting in 2001 (Hoover and Dickson 2007).

Satellite telemetry of 47 eiders from a nesting colony near Bathurst Inlet, Nunavut, indicated these eiders winter off the southeast coast of Chukotka Peninsula, Russia (L. Dickson, pers. comm.). About one-third of the males also moult off Russia. Harvest information for eastern Russia is limited, but suggests a substantial take of eiders. A rough estimate of the subsistence harvest in 2001 in Chukotka was 115 000 eiders (from four different species) (E. Syroechkovski Jr., pers. comm.). However, it is not known what percentage of this take is Pacific Common Eiders from Canadian breeding grounds. The subsistence harvest of Pacific Common Eiders in Canada and Alaska is an estimated 2 500 birds per year (Fabijan et al. 1997).

Northern Common Eider

The northern subspecies of the Common Eider breeds throughout the coastal areas of the eastern Canadian Arctic and Greenland, and winters along the coasts of Newfoundland and Labrador, Quebec and southwest Greenland. This race of eider is subjected to heavy subsistence and sport harvests throughout its breeding, staging and wintering grounds, especially in Greenland (F. Merkel, pers. comm.). Reliable data on population status do not exist and few key habitat sites have been identified; historical data only exist for three sites: Ungava Bay, Hells Gate (high Arctic), and Digges Sound. Recent surveys in Greenland indicate that dramatic population declines have occurred since the 1970s.

Historical data exists for the colonies in Ungava Bay (Chapdelaine et al. 1986) and repeated surveys conducted in 2000 provided the first meaningful population trend data for Northern Common Eiders in Canada. The results show no clear trend in the number of eiders in the three most southerly archipelagos (Gyrfalcon, Payne and Plover), but may show an increase in the nesting population. In contrast, there was a significant decline in the more northerly archipelago (the Eider islands) in the early 1980s (Falardeau et al. 2003). The small Northern Common Eider colonies in Digges Sound (located off the northwest tip of Quebec) were resurveyed in 1999. The survey showed no significant population trend since the early 1980s (Hipfner et al. 2002).

Data also exist for colonies along the Labrador coast. Results of intensive surveys of eider colonies along the lower, central and mid-Labrador coast between 1998 and 2003 suggest strong growth over this period (18% per year; Chaulk et al. 2005). Historical data also exists for the Labrador coast from 1980 and 1994. A repeat survey in 2006 suggests this segment of the population has been increasing at a rate of about 5% per year over this period (K. Chaulk, pers. comm.).

Avian cholera may be an emerging issue for Northern Common Eiders. The first recorded Arctic outbreaks of avian cholera were recorded in Common Eiders in 2004 (northern Quebec), 2005 (Southampton Island), and 2006–2007 (Southampton Island and northern Quebec). Many hundreds of Common Eider ducks died of avian cholera at nesting colonies in northern Hudson Bay and west Hudson Strait in July and August 2004–2005. This finding was first detected by local residents hunting in the area near Ivujivik, northern Quebec. In the summer of 2006, cholera was again detected at eider colonies along the northern coasts of Quebec in Nunavik, and at East Bay, Southampton Island, Nunavut. At East Bay over 3200 eiders (i.e. more than 40% of the nesting females) were killed between late June and early August 2006 (Gilchrist, unpubl. data).

These field studies showed that annual variation in colony attendance of Common Eiders (e.g. low attendance due to heavy ice conditions) make the interpretation of survey data difficult. Long-term annual monitoring of a subset of colonies would be useful to quantify this variation (J.-P.L. Savard, pers. comm.).

A recent review of the band recovery data of Common Eider banded in the eastern Canadian Arctic and western Greenland showed links between breeding populations and their affinities to specific wintering areas in Greenland and Maritime Canada. The majority of bands recovered from eiders banded on Southampton Island, Nunavut since 1996 have been recovered in western Greenland during winter (G. Gilchrist, pers. comm.). Satellite telemetry of eiders during both spring and fall migration also clearly demonstrates that large proportions of the Canadian breeding population winter in western Greenland (A. Mosbech and G. Gilchrist, pers. comm.).

Collectively, these findings show that the majority of Northern Common Eiders winter in southwestern Greenland rather than in Canada, as was previously thought. These recent findings have important management implications because they confirm that the majority of eiders harvested in Greenland during winter are part of the breeding population in Canada. Population and harvest data of the northern common eider have been integrated into a simulation model (Gilliland et al, in press), and the results suggest that the Greenland harvest of Northern Common Eiders is not sustainable, while the total Canadian harvest appears to be sustainable at current levels. In response, an International Eider Conservation and Management Plan were drafted by Canada and Greenland (Gilchrist et al. 2002).

The entire wintering range of Northern Common Eiders in Eastern Canada (and St. Pierre and Miquelon) was surveyed from fixed-wing aircraft in 2003 and in 2006. The preliminary results suggest a total of 222 200 and 178 600 birds overwintered in the Gulf of St. Lawrence in 2003 and 2006, respectively (Bordage, Gilliland and Lepage, pers. comm.). In 2006, birds were distributed as follows: 77 000 along Quebec's coast and 101 500 along the Newfoundland-and-Labrador and St. Pierre and Miquelon coasts. Furthermore in 2006, the survey was expanded to include New Brunswick and Nova Scotia; 56 900 birds overwintered there (D. Bordage, S. Gilliland and C. Lepage, CWS, unpubl. data.).

Although it is understood that some exploitation does occur, accurate estimates of winter and spring harvests on the north shore of the St. Lawrence are largely unknown. Inuit in Nunavut and Nunavik harvest adults in spring, summer and fall, as well as eggs and down in summer. Inuit and non-aboriginal people commercially harvest adults in winter in Greenland. Innu and non-aboriginal people harvest adults in spring and winter in the Gulf of St. Lawrence. Understanding the dynamics of Northern Common Eider populations in the absence of more complete information on the harvest is somewhat problematic; efforts are currently underway to address this knowledge gap.

Hudson Bay Common Eider

The Hudson Bay subspecies of the Common Eider breeds within Hudson Bay and winters in open water leads near the Belcher Islands and off the western coast of Quebec. This is one of the only waterfowl species in the world that spends the entire year in Arctic waters. Mass die-offs can occur in winter when large proportions of the population are concentrated in open-water leads that sometimes freeze over (Robertson and Gilchrist 1998). The frequency and magnitude of these die-offs and the impact that they have on the Hudson Bay Common Eider population is unknown.

Breeding data for this subspecies only exist for the Belcher Islands and the area of LaPerouse Bay, Manitoba. The Belcher Islands, first surveyed in the 1980s, were resurveyed in 1997. The results showed that the breeding population had declined by 70% since the late 1980s, apparently due to winter weather events (e.g. freezing of polynyas) that led to high levels of mortality in 1992 (Robertson and Gilchrist 1998). The Canadian Wildlife Service initiated research into the winter ecology of Hudson Bay Common Eiders in 1998. The three winters that followed were mild, with vast expanses of open sea available to foraging flocks. There have been no significant winter kill events since this work began, and the eider population appears to be recovering.

American Common Eider

American Common Eiders are the most abundant species of sea duck breeding along the East Coast of North America. Their nests are sustainably exploited for down in the St. Lawrence estuary and birds are hunted throughout their breeding and wintering ranges. Based on surveys conducted in the last two decades, breeding population numbers are an estimated 18 000 pairs in Labrador, 3000 in Newfoundland, and 18 000 to 22 000 in Nova Scotia and New Brunswick (R. Milton, pers. comm.).

CWS Quebec Region indicates there are 20 000 breeding pairs in the St. Lawrence estuary and 17 000 in the Gulf of St. Lawrence (J.-F. Rail, CWS, unpubl. data). The number of eiders breeding in northern Newfoundland has been increasing between 9–12% per year throughout the 1990s (S. Gilliland, unpubl. data). There are also a significant number of eiders wintering around St. Pierre and Miquelon (France), where numbers increased over seven years of surveys, from about 2000 birds in 1994 to at least 12 000 birds in 2003 (B. Letournel, National Hunting and Wildlife Agency, France, pers. comm). In contrast to trends observed in Newfoundland and St. Pierre and Miquelon, preliminary analysis suggests eider breeding populations in New Brunswick may be experiencing a long-term decline in population size.

The eider harvest in Canada over the past five years (2002–2006) averaged 17 400 birds. The average number of eiders harvested in Quebec over this period is estimated at 2000 birds annually, while the average Nova Scotia harvest was an estimated 4 800 birds. The largest harvest of Common Eiders in Canada takes place in Newfoundland, where it has been increasing over the last 3 years. The 2007 estimate of 20 100 birds killed is the highest since the early 1980s (Gendron and Collins 2008.). The harvest of Common Eiders in the Atlantic Flyway over the past two years (2006–2007) averaged 22 000 birds, with Maine and Massachusetts reporting the bulk (> 90%) of the U.S. harvest (USFWS 2008b). In the past four years, with support from the Sea Duck Joint Venture, concerted banding efforts have been undertaken in the St. Lawrence estuary, in Newfoundland and Labrador, and in Maine to obtain a better estimate of harvest and adult survival rates.

In the St. Lawrence estuary, eiderdown is harvested every year and parts of the profits are reinvested into conservation activities. During harvesting, the number of nests are counted which provides a yearly population estimate for the most important island and contribute to the long term monitoring of the population. A publication summarising eiderdown harvesting procedures has just been published (Bédard et al. 2008).

Harlequin Duck

Until the 1990s, there was little knowledge of the ecology of Harlequin Ducks (*Histrionicus histrionicus*) in North America. However, recent research efforts have improved our understanding of this species in some areas. Robertson and Goudie (1999) provide a review of available information on the Harlequin Duck.

Eastern Population

The eastern North American population of the Harlequin Duck was listed as endangered in Canada in 1990. As a consequence, hunting of this species was shut down throughout the Atlantic Flyway. In the late 1980s, the population overwintering in eastern North America was estimated at less than 1000 individuals (Goudie 1991). Overhunting, disturbance, and habitat loss are believed to have played a role in the decline of the population (Robertson and Goudie 1999). Later, new information indicating the number of harlequins breeding in Eastern Canada to be significantly larger than suspected led to the population being downlisted to a population of Special Concern (Thomas and Robert 2001).

Studies based on satellite telemetry suggested the existence of two Harlequin Duck populations: one that breeds in northern Quebec and Labrador and overwinters in southwest Greenland, and one that breeds in southern Labrador, Newfoundland, New Brunswick, and the Gaspé Peninsula, and winters mostly in Maine (Brodeur et al. 2002). Genetic studies support the existence of two populations with minimal gene flow (Scribner et al. 2000). The extent to which the breeding and wintering areas of these populations overlap is unknown. The size of the harlequin population that originates in Canada and overwinters in Greenland is also not known, but 6200 moulting harlequins were estimated along the western coast of Greenland during surveys in 1999 (Boertmann and Mosbech 2002). The population of Harlequin Ducks wintering in eastern North America has been increasing in recent years and it is now estimated at about 1800 birds, with most (~1000) wintering in Maine at a single location (Robertson and Goudie 1999; Thomas and Robert 2001). Smaller numbers winter in Atlantic Canada. Counts of Harlequin Ducks wintering in Newfoundland showed minor increases in 1996 and again in 1997. This was encouraging news given the dramatic decline that occurred there through the 1980s and early 1990s.

In May 2003, an aerial survey of 30 rivers on the Quebec North Shore and Labrador (rivers draining into the Gulf of St. Lawrence) uncovered the first evidence of harlequins breeding on the Quebec North Shore. At least 32 Harlequin Ducks, on five rivers in Quebec and two rivers in Labrador, were observed. All harlequins were seen in pairs and found in potential breeding habitats, and were therefore considered as breeding individuals (M. Robert, pers. comm.). An estimated 286 Harlequin Ducks nested on the northern peninsula of Newfoundland. This represents at least 20% of the eastern North American breeding population and highlights the importance of the northern peninsula as a breeding area for this population (S. Gilliland, unpubl. data). There is also evidence of harlequins breeding in southeastern Newfoundland on the Bay du Nord River (S. Gilliland, pers. comm.). In addition, there is evidence of Harlequin Ducks breeding on Baffin Island, Nunavut (Mallory et al. 2004). A publication summarizing the status of the eastern population of Harlequin Ducks is in press as a Special Publication in Waterbirds.

Western Population

Reflecting conservation concern for Harlequin Ducks, considerable attention has focused on western populations, particularly in the Strait of Georgia, over the past decade (S. Boyd and D. Esler, pers. comm.). Collaborative efforts by Canadian Wildlife Service and Simon Fraser University have revealed much about the ecology and conservation of Harlequin Ducks; in fact, Harlequin Ducks in the Strait of Georgia are frequently highlighted as one of the sea ducks about which an unprecedented understanding of ecology and demography exists. In brief, recent findings include: (1) the Strait of Georgia provides non-breeding habitat for > 10 000 Harlequin Ducks, (2) concentrations of Harlequin Ducks in the Strait of Georgia during the herring spawn in the spring number in the thousands, which is a globally unique aggregation, (3) Harlequin Ducks wintering in British Columbia breed across a wide range of mountain streams throughout the province and beyond, (4) Harlequin Ducks show very strong fidelity to wintering and moulting sites, which may make local aggregations demographically discrete and vulnerable to local habitat change, (5) at least some young Harlequin Ducks follow their mothers to wintering areas, further contributing to the formation of distinct, independent population segments, (6) annual survival of adults is high and sustainable, and (7) production of young birds appears to be sufficient to maintain stable population numbers (S. Boyd and D. Esler, pers. comm.).

Focused studies of Harlequin Ducks in the Strait of Georgia are coming to a close. Continuing and future work will focus on the important results derived from previous studies. Surveys of productivity, based on counts of male age ratios during winter will be continued to document annual variation and derive long-term means. Also, a research program was conducted by the Centre for Wildlife Ecology at Simon Fraser University to evaluate the roles of habitat quality, acquisition of nutrients for clutch formation, and interactions with insect-eating fish (S. Boyd and D. Esler, pers. comm.).

Scoters

The three species of scoters that breed in Canada are Black Scoters (*Melanitta nigra*), Surf Scoters (*M. perspicillata*), and White-winged Scoters (*M. fusca*). Almost all Black Scoters breeding in Canada belong to the eastern population, whose breeding ground is centred in northern Quebec. Western Black Scoters have a breeding ground centered in Alaska (Bordage and Savard 1995). Less is known about scoters than about any other group of sea ducks. Research efforts in recent years have brought us to a better understanding of the breeding, moulting, and wintering ecology of this group. Bordage and Savard (1995), Brown and Fredrickson (1997) and Savard et al. (1998) all provide useful reviews of the information available on scoters. Several projects supported by the SDJV have also addressed scoter issues (http://www.seaduckjv.org/ssna.html).

Based on traditional spring waterfowl breeding surveys, scoters as a group seem to have declined in North America over the long term (Savard et al. 1998). The traditional survey area of the Waterfowl Breeding Population and Habitat Survey (Figure 6) covers a large part of the breeding area of White-winged Scoters, and a good substantial portion of the Surf Scoter range. The three species of scoter are not differentiated during these surveys, however, as it is difficult to distinguish among them from fixed-winged aircraft. Based on the extent of known breeding distributions, scoter populations in the Canadian Prairies should be White-winged Scoters only, while populations in Western Boreal Canada include White-winged and Surf Scoters. All three species are present in Alaska. However, these data should be interpreted with caution, as the surveys are not well adapted for estimating scoter numbers (Savard et al. 1998).

In 2008, experimental helicopter surveys designed for scoters were flown in Labrador in collaboration with the Institute for Environmental Monitoring and Research (Gilliland et al. 2008). Results indicated that the Surf Scoter was the most numerous species and that Black and White-winged scoters also bred there in smaller numbers.

The Chaleur Bay area (Quebec and New Bruswick) is a major spring staging area for scoters. During the spring of 2000, counts were made along the Restigouche River estuary. Spring staging numbers peaked at 95 000, with 80–85% of them being Black Scoters and 15–20% being Surf Scoters. These counts are considered to be conservative (M. Lushington, J. Clifford, and P. Hicklin, pers. comm.). Aerial surveys that had been photo corrected for observer error indicated an Atlantic Flyway spring staging population of 90 000 Black Scoters in Chaleur Bay (New Brunswick and Quebec), and the St. Lawrence estuary (Quebec)in 2005 (K. McAloney, CWS, unpubl. data).

In Eastern Canada, in mid-May of 1998, surveys in the St. Lawrence estuary and gulf yielded over 200 000 scoters (mostly Black and Surf scoters). More recent surveys in September and October 2006 indicated that the St. Lawrence estuary was an important staging area for Surf Scoters in fall, since nearly 80 000 birds were counted there (J.-P. Savard, pers. comm.). Moult surveys in late July and early August of 2006 year indicated that some 50 000 scoters (mostly male Surf and White-winged scoters) moulted within the St. Lawrence estuary (J.-P. Savard, pers. comm.). Also, between 50 000 and 62 000 moulting scoters (mostly male Surf Scoters) were sighted along the Labrador coast in 1998 and 1999 (S. Gilliland, pers. comm.). Thousands of Black Scoters moult in James Bay (Ross 1994; Bordage and Savard 1995). A summer survey was undertaken along the western James Bay coast in 2006 (K. Ross and K. Abraham, pers. comm.), primarily to investigate survey methodology; preliminary estimates suggest numbers were higher than those encountered in 1991 (Ross 1994). Surf Scoters are counted during the Eastern Waterfowl Survey, which shows a significant increasing trend in the Eastern Boreal Shield since 1990 (Figure 22).

Although found at very low densities on the Canadian Prairies, scoter numbers have declined over the long term based on the results of the Waterfowl Breeding Population and Habitat Survey (Figure 23).Surveys in 2008 indicated an estimated 931 182 individuals in the entire survey area, which is a decline of 4% from 2007 (figure 23). However, an increase took place in the Western Boreal stratum population, where scoter numbers were up 2% over the previous year (Figure 23).

A more detailed examination of trends in various strata showed intriguing results. Alisauskas et al. (2004) showed that, contrary to the overall declining trend, scoters increased over the previous decade in northern Manitoba and Saskatchewan, but continued to decline in northern Alberta and the Northwest Territories. Their research, making use of reverse-time capture histories of White-winged Scoters at Redberry Lake, Saskatchewan, shows the long-term decline in the local population has now been arrested. Interestingly, this occurred as a result of increased recruitment through the immigration of adult females (Alisauskas et al. 2004).

Large concentrations of Surf Scoters and White-winged Scoters are found in coastal British Columbia, in habitats that also support shellfish aquaculture, an industry that has the potential to expand dramatically. Simon Fraser University and CWS have completed a study of the interactions between scoters and the shellfish industry, evaluating potential effects on scoter population sustainability at local and regional scales (S. Boyd and D. Esler, pers. comm.). The findings suggest that, at current levels of activity, the overall effect of the industry in one important area for both shellfish and scoters is sustainable (Baynes Sound). The project has resulted in the publication of several papers and two master's theses completed.

In response to the apparent decline in scoter numbers, reductions were made in 1993 in the bag limits for scoters in the United States and Canada alike. The harvest of all three scoter species in Canada and the United States has declined considerably since the 1970s (tables 9 to 11), although harvest levels of Black and Surf scoters in the Atlantic Flyway in 2007 again appeared to be near historic levels. In Canada, the harvest is estimated at about 800 to 2 000 birds of each species.

Barrow's Goldeneye

Eastern Population

Until recently, little was known about the eastern North American population of Barrow's Goldeneye (*Bucephala islandica*), which was believed to be composed of no more than 4500 birds (Robert et al. 2003). This corresponds to a breeding population of about 1400 pairs (30% of birds are adult females). In 2000, the small eastern population was listed by COSEWIC as being of Special Concern. Because of the potential threat to the species, most Barrow's Goldeneye wintering and staging areas in Canada have been closed to hunting. However, because the Barrow's Goldeneye is an arboreal species, forestry operations on its breeding grounds is more likely to be a threat (Robert et al. 1999).

From 1997 to 2005, the distribution, seasonal abundance, and age and sex ratios of wintering Barrow's Goldeneyes was documented in the St. Lawrence River, Quebec, using a combination of ground and helicopter surveys (Robert and Savard 2006). The results indicated that the eastern North American wintering population of Barrow's Goldeneyes may include a maximum of 6 187 individuals, of which > 90% winter along the St. Lawrence estuary and gulf. About 400 individuals winter in the Atlantic provinces and 100 individuals in Maine (Robert and Savard 2006).

Results of Christmast Bird Counts from tadoussac suggest a slight increase in Barrow's Goldeneye numbers in the last decade (Savard 2008).

Recent studies by the Canadian Wildlife Service in Quebec have identified the main breeding area of the eastern population of Barrow's Goldeneye. It consists mainly of the small lakes of the high plateaus north of the St. Lawrence River from the Saguenay River east to at least Mingan, Quebec (Robert et al. 2000). It is likely that part of the population also breeds on the high plateaus west of the Saguenay River (Savard and Dupuis 1999). The first official breeding record for the eastern population was obtained in 1998, when a brood was sighted on Lac des Polices in ZEC Chauvin, a few dozen kilometres northwest of Tadoussac, Quebec. Since then, several broods were observed about 60 km northwest of Sept-Îles, Quebec (Robert et al. 2000) and in the ZEC Chauvin area in 1999 (M. Robert, pers. comm.). Satellite tracking data show that at least some Barrow's Goldeneyes wintering along the St. Lawrence corridor breed inland along the north shore of the St. Lawrence estuary and gulf. In fact, high numbers of pairs and lone males detected in aerial and ground surveys conducted from 1990 to 1998 indicate that this area is probably the core breeding area for the eastern population of the Barrow's Goldeneye (Robert et al. 2000).

In eastern North America, the only known moulting sites for adult male Barrow's Goldeneyes are located in the coastal waters of Hudson, Ungava, and Frobisher (Baffin Island) bays, and in a few coastal inlets of northern Labrador (Robert et al. 1999; Robert et al. 2002). Two moulting areas (Tasiujaq and Tuttutuuq River, Ungava Bay) were identified while tracking males with satellite telemetry in July 2000. At least 200 goldeneyes (mostly Barrow's) were at the first location, while at least 3000 goldeneyes (mostly Common) were in the latter area (M. Robert, pers. comm.). Barrow's Goldeneye spent up to four months in the moulting locations, highlighting the importance of these areas in the annual cycle (Robert et al. 2002).

Western Population

There are no accurate population estimates or trends for the western population of Barrow's Goldeneye. However, it is believed to be stable or declining slightly. Some short-term data are available for this population from the breeding waterfowl surveys of the southern Yukon (figure 24). Compared to 2007, the number of breeding pairs of Barrow's Goldeneye declined by 1% in the southern Yukon in 2008 (Hawkings and Hughes 2008) It should be noted that data for the southern Yukon (Figure 24) are scaled to a constant value for 1991, and represent departures from this constant and not an absolute density. While breeding pair numbers during the 16 years of the southern Yukon survey show no overall trend.

Barrow's Goldeneye and Bufflehead research undertaken in central B.C. from 1997 to 2001 found Barrow's Goldeneye nests located primarily in abandoned Pileated Woodpecker cavities located in large Aspen trees (Evans 2003). Over 90% of all cavities were within 200 metres of a body of water. Barrow's Goldeneyes appear to select more productive wetlands, and invertebrate abundance within a wetland was positively correlated with duckling masses at day 40, pre-fledging survival, and first-year return rates.

Moulting female Barrow's Goldeneyes have been banded annually since 1988 in central B.C., in an area where the breeding population has also been banded. Survey and recapture data indicate that Barrow's females do not moult locally (with or without their broods) and that they can aggregate into small groups for the wing moult (A. Breault, pers. comm.). The differences in composition between the breeding and moulting populations indicate that central B.C. experiences two different moult migrations: the local breeders depart for an unknown destination, while birds of unknown origin come in and replace local breeders on breeding ponds. The geographic extent of the female Barrow's Goldeneye moult and the number of females involved is currently unknown.

From 2006 to 2008, W.S. Boyd (Environment Canada, Science and Technology Branch) and D. Esler (Simon Fraser University – Center for Wildlife Ecology) have satellite-tagged all age and sex classes of Barrow's Goldeneye at a study site in the interior of BC (Riske Creek). All males marked in May 2006, 2007 and 2008 migrated north to northern AB and NT to moult and many are showing high site-fidelity to both moulting and wintering sites, and an especially strong connection with a moulting/staging site in AB, Cardinal Lake. Hens and hatch year birds marked in July 2008 are currently being tracked. Location data for all birds will be downloaded over the next year after which time detailed maps will be generated describing migration routes, site fidelity, and affiliations between breeding, moulting, staging and wintering sites. Results will be used to understand goldeneye population structure.

Other Sea Ducks

Information on other sea duck species from the Waterfowl Breeding Population and Habitat Survey and the Eastern Waterfowl Survey is presented in Figure 22. Information on western Goldeneye species, Bufflehead and Hooded Merganser from the roadside surveys in the Yukon and the interior of British Columbia is presented in figure 24.

The Waterfowl Breeding Population and Habitat Survey shows significant increases in numbers of mergansers, goldeneyes and Buffleheads over the long term, but a declining trend for Long-tailed Ducks (Table 4).

Population Status of Geese

Breeding Conditions in the Canadian Arctic and Subarctic Regions in 2008

Spring nesting conditions for geese and swans across the Canadian and Alaskan Arctic were improved in 2008 compared with 2007. Much of the eastern Arctic and subarctic experienced well-above average temperatures in May, which promoted conditions favorable for the production of young. Reports from most other areas indicated near-average nesting phenology and average production of young in 2008. Poor nesting conditions were reported from the Mississippi Valley Population Canada goose range, Wrangel Island (Russia), some areas along western Hudson Bay, Bristol Bay (Alaska), and interior Alaska. The snow and ice cover graphic indicates substantially less snow cover on 2 June in 2008 than in 2007 (USFWMS, 2008a).

Snow Goose

Greater Snow Goose

Greater Snow Geese (*Chen caerulescens atlanticus*) breed in the eastern Arctic around northern Foxe Basin, northern Baffin, Bylot, Axel-Heiberg and Ellesmere islands, and northern Greenland. They winter along the mid-Atlantic coast from New Jersey to North Carolina. During migration, the entire population stages in southern Quebec in the marshes and agricultural lands.

The growth of the Greater Snow Goose population from a few thousand birds in the 1930s to over 500 000 in spring in the early 1990s has been well documented (Reed et al. 1998a). Aerial surveys of the main staging area in southern Quebec have been conducted every spring since 1965. Five aircrafts are used simultaneously during a one-day survey effort to further increase coverage and limit survey flight duration to the mid-day period. The spring 2008 population estimate during staging in southern Quebec was 1 004 000 ± 124 000 geese, a value similar to the estimates of the two previous years (Figure 25; J. Lefebvre, pers. comm.). The population has remained relatively stable since 1999, the year in which special conservation measures were implemented.

A study of the reproductive ecology of Greater Snow Geese at the Bylot Island breeding colony continued in 2008 (G. Gauthier, pers. comm.). Spring was very early on Bylot Island. Following an early and fast snow melt, the geese were ready to initiate nest. Median peak laying date of the first egg was 10 June, which is 2 days earlier than the long-term average (June 12). Under these conditions, clutch size was higher than the long-term average (4.10 eggs in 2008; long-term average: 3.73). The Bylot research team banded over 3 400 geese. The ratio of goslings to adults among geese captured was 1.11, which is higher than the long-term average of 1.04.

The majority of research on Greater Snow Geese has taken place at the Bylot Island colony, but in 2008, a Canadian Wildlife Service team was able to conduct field work on the Fosheim Peninsula of Ellesmere Island and adjacent portions of Axel Heiberg Island. The crew followed brood-rearing activity and also installed exclosures to monitor conditions of wetland habitats (annual plant production and goose grazing impact). In August, the team banded over 560 geese (Lefebvre, pers. comm.).

In Canada, the 2007 fall goose harvest was estimated at 62 230 (Table 12), well below the harvest in 2006 and to the five-year average (71 831). In the U.S., the harvest was estimated at about 50 742 birds, which was near average for the most recent five-year period.

An estimated 34 188 birds were harvested in spring 2008 in Canada (Collins and Gendron 2008). Numbers for the spring hunt were slightly above 2007 numbers, but continue to be much lower than those achieved when the conservation season was first introduced in 1999 (Figure 26). There are no special conservation measures in place in the United States for Greater Snow Geese.

Lesser Snow Goose

Lesser Snow Geese (*Chen caerulescens caerulescens*) nest in colonies throughout much of the coastal areas of the Canadian Arctic. These colonies can be grouped according to three regions: the eastern Arctic (Southampton and Baffin islands, and the western and southern shores of Hudson Bay), the central Arctic (mainland from Coppermine in the west to Gjoa Haven in the east, and western Victoria Island), and the western Arctic (Banks Island, and the Anderson and Mackenzie River deltas).

Breeding ground surveys have shown substantial growth of Lesser Snow Goose populations at several colonies and the establishment of new colonies in recent years (Batt 1998). Canadian Wildlife Service is coordinating a series of photographic inventories of major Lesser Snow Goose nesting colonies, and these results are reported below.

The increasing number of Lesser Snow Geese in the eastern and central Arctic is also shown by surveys on wintering areas throughout the late 1990s. It should be noted that these geese are also referred to as the Mid-continent Lesser Snow Geese. Mid-winter counts increased from 0.78 million geese in 1970 to nearly 3.0 million in 1998 (Kruse 2007; Figure 27). The 2008 mid-winter count was close to that peak, with about 2.5 million geese (USFWS 2008a). These counts include some Ross's Geese and probably a small proportion of Lesser Snow Geese originating in western Arctic colonies. However, mid-winter counts underestimate actual population levels, and probably increasingly so, as populations have grown (Mowbray et al. 2000).

Eastern Arctic Colonies

In 2003, 2004 and 2005, photographic inventories of the largest Lesser Snow Goose nesting colonies in the eastern Arctic were conducted, for comparison to earlier counts in the early 1970s and in 1997. When the Great Plain of the Koukdjuak (on Baffin Island) and Southampton Island were first surveyed in 1973, there were only 446 600 and 155 800 nesting birds, respectively (Kerbes 1975), and the area where nests were found was much smaller. By 1997, those colonies had grown to 1.7 and 0.7 million nesting birds, respectively (Figure 28). Estimates of nesting snow geese on Southampton Island in 2004 suggested numbers similar to 1997, whereas those estimated on Baffin Island in 2005 indicated the population may have declined slightly (Figure 28).

At West Hudson Bay, snow goose numbers declined by about half between 1985 and 1997, when they numbered just over 200 000 geese (Figure 28). Estimates from photo surveys conducted in 2003 suggest that the nesting population increased slightly between 1997 and 2003, but that most of the increase occurred north of the traditional nesting colony centred at the McConnell River and especially to the north of Arviat, Nunavut. The nesting chronology at McConnell River in 2008 was similar to 2007, and probably slightly later than the average for the past five years.

In the Hudson Bay lowlands, surveys conducted between 1996 and 2003 showed the number of nesting pairs to be declining from the peak in 1997, when 430 000 birds were estimated nesting in the area between La Pérouse Bay, Manitoba, and Cape Henrietta Maria, Ontario (K. Ross and K. Abraham, pers. comm.). The 2006 survey of the La Pérouse Bay colony yielded 41 800 breeding pairs, virtually the same number as in 1997 (i.e. 41 700 pairs); the two small colonies near Thompson Point held 1700 and 5400 pairs, respectively (K. Abraham, R. Rockwell, and K. Ross, pers. comm.). The Cape Henrietta Maria colony contained an estimated 129 000 nesting pairs in mid-incubation in 2001, and 128 000 pairs in 2003. These data represent a considerable increase from 1979, when the nesting population was estimated at 55 000 nesting pairs (P. Anghern, unpubl. report). In 2005, a survey was conducted at Cape Henrietta Maria on June 7–8 and the extent and density of the colony appeared similar to 2001 and 2003 (K. Abraham and K. Ross, pers. comm.). Nesting pair surveys were also conducted at West Pen Island (June 5) and Shell Brook (June 4) colonies on the Hudson Bay coast. The West Pen Island colony had high densities in an occupied area similar to the 1997 survey, when approximately 8500 pairs were estimated. However, the area occupied and the number of pairs estimated in 2005 at Shell Brook was greatly reduced from the 1997 estimate of 2700 pairs. (K. Abraham and K. Ross, pers. comm.)

At James Bay, the small Akimiski Island colony (Abraham et al. 1999a) was also surveyed. Between 1998 and 2000, the colony consistently had an estimated 900 breeding pairs (K. Abraham, pers. comm.), increasing to about 1500 pairs in 2001 and remaining about the same in 2003.

Breeding conditions at Cape Henrietta Maria and

Akimiski Island were about average in 2008. However a late spring snow storm along the eastern portion of the Hudson Bay coast may have had a negative impact on productivity.

Central Arctic Colonies

The central Arctic breeding population, concentrated in the Queen Maud Gulf, grew more slowly than the eastern population before the 1980s, but now appears to be increasing rapidly. Part of the rapid growth may be due to the immigration of eastern Arctic birds. In 1976, there were 30 colonies with nearly 56 000 nesting Lesser Snow Geese. By 1988, the number of colonies had increased to 57, with about 280 000 nesting Lesser Snow Geese (Kerbes 1996). Information from a photographic inventory conducted in 1998 indicated that the snow goose population was in excess of 700 000 scattered over 80 colonies (R. Kerbes, unpubl. data). This suggests that the population had more than doubled since the last photographic inventory (Figure 28).

At Karrak Lake in the Queen Maud Gulf, the area used by nesting Ross's Gesse and Lesser Snow Geese has been increasing exponentially. In 2004 the area of terrestrial habitat occupied by nesting geese at Karrak Lake increased from 177 km^2 to 201 km^2. However, the nesting area did not change in 2005 (198 km^2). Similarly, at the East McNaughton colony of light geese, about 90 km east of Karrak Lake, the area of terrestrial habitat occupied by nesting geese increased from 214 km^2 to 230 km^2 (R. Alisauskas, pers. comm.).

Western Arctic Colonies

More than 95% of Lesser Snow Geese in the western Canadian Arctic nest on Banks Island. This population increased substantially between the 1960s and 2002. The total nesting population increased, growing from around 105 000 birds in 1960 to 165 000 in 1976, and exceeding 479 000 in 1995 (Kerbes et al. 1999). Photographic inventories of the colony indicate that the number of nesting birds on Banks Island has declined dramatically between 2002 and 2007 from 570 000 to 300 0000 geese (C. Wood, pers. Comm.) (Figure 28). Further investigation is needed to determine if this decline is real or an artifact of a poor breeding season due to the late spring in 2007.

The remaining western Arctic snow geese nest at small mainland colonies on the Anderson River and Kendall Island Migratory Bird Sanctuaries. The mainland populations have varied in size from year to year (Kendall Island) or declined (Anderson River) during the last decade. An aerial survey in spring 2008 of the two mainland nesting areas indicated that the nesting effort was much lower compared to 2007. Aerial surveys in August indicated productivity was below average at Kendall Island and above average at Anderson River (C. Wood, pers. Comm.). Lesser Snow Geese nesting on Wrangel Island, Russia, are also of great interest to Canada, because this population migrates through Western Canada in fall and spring, and more than half of the population winters in the Fraser Delta (B.C.) and the nearby Skagit Delta (Washington). The present colony of Lesser Snow Geese on Wrangel Island is all that remains of the large colonies that existed in Siberia a century ago. Russian biologists monitoring the population have documented a decline from 120 000 nesting birds in 1970 (total population of 150 000 geese) to fewer than half that number in the 1990s (total population of 60 000–70 000 geese) (Kerbes et al. 1999).

Baranyuk (Wrangel Island Reserve, Russia, pers. comm.) reported the 2008 spring breeding population of Wrangel Island snow geese numbered 145 000 birds, a slight increase over the 140 000 birds counted last year. Breeding conditions in 2008 were less favourable than those of the previous two years. The main colony had approximately 12 000 nests (down from 35 000 last year). This represents the first poor year following an unprecedented run of 10 consecutive good breeding years on Wrangel Island. This is being confirmed on the Fraser and Skagit River deltas where preliminary sampling indicates < 5% young.

British Columbia's Fraser-Skagit winter population has roughly doubled since the early 1990s, increasing to 102 000 birds in 2006-2007, the highest abundance ever recorded. In 2007-2008, the population was estimated at 95 000 birds. This population increase has gradually resulted in an equally large reduction in the biomass of the geese's preferred food, bulrush, on the Fraser River delta, especially after the population increased to more than 50 000 birds (S. Boyd, pers. comm.). To control population numbers amendments were made to the hunting regulations in 2003–2004 and again in 2007–2008. Although these measures should increase harvest rates and help reduce total numbers, it may be necessary to make further regulatory changes to limit the population to the point where the marsh habitat is maintained at a healthy, sustainable level.

Harvest of Lesser Snow Geese

In the United States, Lesser Snow Geese are harvested in all four flyways, but mostly in the Mississippi and Central flyways. In 2007, the total U.S harvest estimate was 511 993 geese, a decrease of 12% and 5% respectively compared to 2005 and 2006 (Table 13). In Canada, the estimated harvest was 106 945 birds in 2007, a decrease of 35% compared to 2006 but similar to 2004 and 2005.

Since 1990, CWS Pacific and Yukon Region has conducted a special annual harvest survey of Lesser Snow Geese from the Wrangel Island population. Prior to 2003, harvest estimates varied from a low of 623 in 1990 to a high of 1989 in 2003 (A. Breault, unpubl. data; Figure 29). The harvest for the 2007 hunting season was estimated at 4 785 birds, which was the highest harvest estimate ever recorded since the survey started in 1990. These figures include adjustment for crippling loss, which is estimated at 20%. Approximately 95 000 snow geese wintered in the Fraser and Skagit River deltas in 2007–2008, the largest number recorded since monitoring began in 1948. (S. Boyd, pers. comm.).

Management of Overabundant Snow Geese

Issue

The rapid growth of most snow goose populations is of great concern. Assessments of the environmental effects of the rapidly growing populations of mid-continent Lesser Snow Geese and Greater Snow Geese were completed by working groups of Canadian and American scientists. Their analyses are contained in the comprehensive reports entitled *Arctic Ecosystems in Peril – Report of the Arctic Goose Habitat Working Group* (Batt 1997) and *The Greater Snow Goose – Report of the Arctic Goose Habitat Working Group* (Batt 1998). These working groups concluded that the increase in snow goose populations were primarily human induced. Improved farming practices supplying a steady food source along with the safety of refuges have resulted in increased survival and reproductive rates in snow geese. These populations have become so large that they are affecting the plant communities at staging areas and breeding grounds on which they and other species rely. Grazing and grubbing by geese not only permanently removes vegetation, but also changes soil salinity, nitrogen dynamics and moisture levels. The result is the alteration or elimination of the plant communities, which in all likelihood will not be restored. Although the Arctic is vast, the areas that support migrating and breeding geese and other companion species are limited in extent, and some areas are likely to become inhospitable for decades. Increasing crop damage is also an important consequence of the growing snow goose populations.

Increasing numbers of spring migrant Greater Snow Geese are being observed on the tidal marsh habitats in and around Restigouche County, New Brunswick. The Canadian Wildlife Service, in concert with the New Brunswick Department of Natural Resources and Energy, is examining the possibility of establishing future special conservation measures in New Brunswick, to assist efforts already in place in Quebec to curtail the rapid population growth and reduce the population size of Greater Snow Geese. Consultations to determine whether the special measures in place in Quebec should be extended to include north-western New Brunswick are ongoing.

Regulation

Several concurrent management measures are being undertaken to curtail the rapid population growth and reduce population size to a level consistent with the carrying capacity of the habitat. One involves attempting to increase the mortality rate of snow geese by two to three times the rate achieved prior to the introduction of the special conservation measures. Beginning in 1999, an amendment to the *Migratory Birds Regulations* created special conditions under which hunters were encouraged to take overabundant species for conservation reasons and, in some cases and subject to specific controls, to use exceptional methods and equipment such as electronic calls and bait. The 1999 and 2000 regulations applied in selected areas of Quebec and Manitoba. Beginning in spring 2001, special conservation measures were also implemented in Saskatchewan and Nunavut. The dates and locations of application of these special conservation measures were determined in consultation with the provincial governments, other organizations and local communities.

Evaluation

Evaluation plans are being implemented to track progress toward the goals of reduced population growth and, ultimately, recovery by plant communities.

For Lesser Snow Geese, the original objectives were to increase the continental harvest to approximately 0.8 to 1.2 million birds annually (Rockwell et al. 1997). These projections were later challenged as being too conservative, and annual harvest requirements of 1.4 to 3.4 million birds were projected using updated information (Cooke et al. 2000; Rockwell and Ankney 2000). Annual continental harvests of mid-continent light geese has not met the objectives in any year. Photographic and ground-based surveys of some nesting colonies of Lesser Snow Geese suggest that the population has increased since 1997, and survival rates of adult snow geese remain high. Lesser Snow Geese remain extremely abundant, and continue to have negative effects on Arctic habitats. An evaluation of the effectiveness of the special measures for mid-continent Lesser Snow Geese is underway.

In the case of Greater Snow Geese, the population objective adopted by the *North American Waterfowl Management Plan* was 500 000 birds, down from the nearly 1.0 million birds present in

1999. A recent evaluation demonstrated that special measures (of which the spring season was key) have been successful in reducing the annual survival rate for adults from about 83% to about 72.5% (Calvert et al. 2007). This is reflected in the spring counts, which show the population to have stabilized at between 800 000 and 1 000 000 birds, which is still well above the goal. Moreover, models show that without a spring harvest, the population would quickly begin to grow again (Gauthier and Reed 2007) because of climatic changes that favour good breeding conditions in the Arctic as well as improved feeding conditions (corn and other crops) on wintering and staging grounds. At the same time, however, it appears that the harvest in Canada has been maximized.

Canada's strategic plan for the period 2005 through 2010 lays out key directions for managing Greater Snow Geese (Bélanger and Lefebvre 2006). These include: maintain a good-quality, long-term survey to estimate the size of the continental population; monitor the population's response to management measures; achieve the necessary harvest rates in Quebec; work with American authorities toward increasing the harvest of Greater Snow Geese on their wintering grounds; maintain good-quality nesting and staging habitats in Quebec; maximize bird-watching and hunting opportunities; and review the crop damage prevention and compensation programs.

Proposal for 2009-2010

Special measures for spring 2009 are posted on the Canadian Wildlife Service's Web site (http://www.cws-scf.ec.gc.ca/publications/reg/abund_e.cfm) (Appendix A).

The Canadian Wildlife Service has previously stated its intention to fix the dates for special conservation measures in Manitoba and the Saskatchewan spring hunt for mid-continent Lesser Geese for the period from 2007–2008 to 2010–2011. This means that the regulations in effect during spring 2009 have not changed for the past three years.

In Quebec and Nunavut, no changes to the special measures were judged necessary for spring 2009. Note that fixed measures may also be considered in future for Nunavut and Quebec.

Regulations specific to special measures in **fall 2009,** if needed, will be proposed in the Canadian Wildlife Service Waterfowl Committee's *Report on Regulatory Proposals*, to be published in December 2008.

Ross's Goose

About 95% of all Ross's Geese (*Chen rossii*) nest in the Queen Maud Gulf area of the central Canadian Arctic. Increasing numbers are being found along the western coast of Hudson Bay, on Baffin, Southampton, and Banks islands, at La Perouse Bay, Manitoba, and Cape Henrietta Maria, Ontario (Kerbes 1994; D. Caswell, pers. comm., K. Abraham, pers. comm.). Nesting colonies of Ross's Goose are usually interspersed with those of Lesser Snow Geese, so it is difficult to accurately evaluate the size of Ross's Goose populations. Ross's Geese winter in California, New Mexico, Texas and Mexico.

Ross's Goose was considered a rare species in the early 1900s. When legislation was passed to prohibit hunting in 1931, the estimated population of Ross's Goose was only 5000 to 6000 birds. By 1988, the breeding population had increased to more than 188 000 birds in the Queen Maud Gulf Migratory Bird Sanctuary (Kerbes 1994; Ryder and Alisauskas 1995) and to about 982 000 in 1998 (Alisauskas et al. 1998). Helicopter surveys on Baffin Island, in conjunction with the banding in August, indicated that there may be more than 10 000 Ross's Geese present in some years (D. Caswell, pers. comm.). A new colony of nesting Ross's Geese became established near the McConnell River, Nunavut, in the early 1990s, and was estimated at more than 70 000 birds in 2003. The colony continued to increase and was estimated at about 90 000 nesting birds in 2005 (J. Caswell, pers. comm.). Information gathered while banding Lesser Snow Geese near Cape Henrietta Maria, Ontario, indicated that the Ross's Goose population there may now be as large as 2250 pairs (Abraham 2002). The largest colony of Ross's Goose is found near Karrak Lake in the Queen Maud Gulf, where an estimated 479 400 birds nested in 2001 (Alisauskas 2001).

A recent analysis by Alisauskas et al. (2006) described changes in the geographic distribution of Ross's Geese in winter. Over the past decade the wintering populations, and the harvest, have shifted eastward, matching the eastward expansion of the breeding populations. These authors also found that the continental harvest of Ross's Geese began to grow some time around 1994, when the normal hunting seasons were made more liberal. Prior to 1994, the survival rate for adults was at least 0.91, but since then numbers have declined to about 0.80. Alisauskas et al. (2006) concluded that at the current rate of annual survival, the Ross's Goose population should, at a minimum, remain stable or even continue to grow.

Greater White-fronted Goose

In the past, Greater White-fronted Goose (*Anser albifrons*) surveys were conducted in early spring, but these counts were problematic when geese were too widely spread along their migration route to allow for good counts. As numbers of Mid-continent Lesser Snow geese increased in the important count areas, the surveys became even more problematic; they were abandoned in 1992. However, until the early to mid-1980s, the surveys did a good job of tracking the trend in Greater White-fronted Goose numbers, indicating that the overall population grew from the late 1950s to the early 1980s (J. Hines, pers. comm.).

In 1992, a fall survey of the staging areas in Saskatchewan and Alberta was implemented with the objective of providing an annual index of the population size of Mid-continent Greater White-fronted geese. Because it is unlikely that significant numbers of geese are present outside the survey area in most years (based on historical migration and distribution data, as well as experimental surveys), this fall inventory accounts for a consistent and significant proportion of the population (Nieman et al. 2001). Preliminary results for fall 2008 indicate a total of 751 700 geese, which represents a 2% decrease over 2007 and a 12% increase in the three-year average. The current three year average is 755 700 (Figure 30) (Warner et al., in prep.).

Banding of Mid-continent White-fronted Geese, begun in 1990 in the Queen Maud Gulf Migratory Bird Sanctuary, is providing new data about these birds and their movements. This concrete information allows for informed decision making about population management. Annual survival declined over this period, from a maximum of 87% in 1993 to the lowest estimate of less than 70% in 2000. Mean estimated lifespan has also decreased. From a former maximum of 7.8 years, lifespan would now be closer to 3.7 years, with a survival rate equivalent to that estimated in 2000 (Alisauskas 2002a).

The estimated Canadian harvest for 2007 was 69 958, a 27% increase from the 2006 estimate and very close to the ten-year average (72 365;Table 14). In the U.S., the 2007 harvest was 352 362 birds, about 25% higher than the previous year's yield, representing the highest harvest ever recorded. Recent trends in the annual population index combined with relatively high harvest rates and evidence of declining survival remain a cause for caution with regard to the international management of mid-continent White-fronted Geese (D. Nieman, pers. Comm.).

Canada Goose and Cackling Goose

Until recently, geese of the species *Branta canadensis* breeding in Canada were recognized as a single species, although debate around the validity of this taxonomic clustering continued (summarized in Dickson 2000). Over the years, many authors suggested two species should be recognized: small-bodied birds with relatively short necks and bills and larger-bodied birds with proportionately longer necks and bills (Mowbray et al. 2002). In 2003, after reviewing the genetic evidence, the American Ornithologists' Union identified two species of geese from the one species previously referred to as *B. canadensis* (Banks et al. 2003). Birds of the large bodied or *B. canadensis* group, consisting of seven subspecies, typically nest in inland and more southerly regions, while the four subspecies of the smaller Cackling Goose (*B. hutchinsii*) more typically breed in tundra habitats (http://www.sibleyguides.com/canada_cackling.htm).

The many different races of Canada Goose (*B. canadensis*) and Cackling Goose (B. *hutchinsii)* that have part of their breeding range in Canada are grouped into 15 different management populations. The distribution of Canada Goose and Cackling Goose populations are shown in Figures 31a,b,c.

Table 15 presents overall harvest estimates for Canada and the United States. It should be pointed out, however, that these numbers are composed of birds from more than one population. Because the surveys cannot differentiate among the different populations of Canada Goose and Cackling Goose, they are inadequate for estimating the harvest level of each population. Partitioning of the harvest requires comprehensive banding programs or analysis of molecular markers. Harvest of Canada Geese and Cackling Geese has been on the rise, with the continental harvest surpassing 3 million annually since 2001. The estimated Canada and Cackling geese harvest in 2007 was 703 857birds in Canada, whereas about 2 676 194geese were harvested in the U.S. (Table 15).

North Atlantic Population (NAP) Canada Goose

Canada Geese belonging to the North Atlantic population, which is thought to be primarily composed of the subspecies *B. c. canadensis*, breed in Labrador, insular Newfoundland, and eastern Quebec, including Anticosti Island (Figure 31a). The breeding population is surveyed by the helicopter plots of the Eastern Waterfowl Survey. An expanded helicopter plot survey was initiated in 2001 when it became evident that neither the original Eastern Waterfowl Survey nor the fixed-wing transects carried out by the USFWS adequately covered the breeding range of this population. Efforts to integrate data from the two survey platforms are ongoing.

Stratum 2 of the Eastern Waterfowl Survey approximates the breeding range of the NAP. A method for integrating the results of the two survey platforms is being developed; in the interim, the data from the helicopter plots only is presented in Figure 32. In 2008 the total estimated indicated pairs was 47 417, which is approximately equal to the average of the past decade (44 174), and about 15% above the average (37 762) since the survey began in 1990 (Figure 32).

Preliminary banding efforts undertaken in Labrador in the summer of 2007 identified the presence of Canada Geese banded as juveniles in several northeastern U.S. states. As has been documented for other Canada Goose populations (see below), the presence of moulting, temperate-breeding migrant geese is a concern in terms of both the accuracy of breeding survey estimates and the potential effects on locally breeding geese of the North Atlantic population due to competition for resources.

Atlantic Population (AP) Canada Goose

Atlantic Population Canada Geese (composed largely of *B. c interior)* nest throughout northern Quebec, especially along the shores of Ungava Bay and eastern Hudson Bay. A recent review by Mallory et al. (2005) added locations on Baffin and Somerset islands, Nunavut, that are more northerly than the known breeding range. Eastward across Baffin Bay, Canada Geese breeding in western Greenland appear related to the Atlantic population birds, based on measures of morphology and genetic characteristics (Fox et al. 1996; Scribner et al. 2003). Atlantic Population Canada Geese winter from New England to South Carolina, with the largest concentration occurring on the Delmarva Peninsula (Figure 31a).

In 1993, an annual breeding ground survey was introduced in northern Quebec with the objective of estimating the number of breeding pairs on the Ungava Peninsula (Harvey and Rodrigue 2007). Estimates produced by this survey are not adjusted for visibility bias and thus represent an index to the population. This survey covers the three regions that were shown previously to include the highest densities of nesting geese: the region of inland tundra, the region of flat coastal tundra (coastal Ungava Bay and Hudson Bay), and the region of taiga.

In 2008, the number of Canada Geese observed as pairs or as single birds (together representing the number of indicated breeding pairs) was 169 699, a significant decrease over the previous year's estimate of 195 709, but still comparable to estimates in recent years (Harvey and Rodrigue 2008; Figure 33).

While the breeding pair and total population estimates have both risen nearly five-fold since 1995, caution should be used when interpreting the estimate of total population size as it includes breeding pairs, non-breeders, failed breeders, and moulting migrants from other areas. Harvey and Rodrigue (2008) noted that the difference in density of breeding pairs has become much more obvious since 2001, with the Hudson Bay coast now supporting more than three times the density of breeding pairs as the Ungava Bay coast. This could be related to a number of factors, including differential survival or productivity rates; regardless the potential for growth appears to be more limited for geese nesting along the Ungava Bay coast.

Snowmelt, and subsequently nest initiation, was early in 2008. The mean nest initiation date at four monitored sites around Ungava Bay was 24 May, which is 19 days earlier than in 2007 and 4 days earlier than the long-term average. The total number of nests found and the mean clutch size for the four sites surveyed along Ungava Bay were 75 and 4.7, respectively. Clutch size in 2008 was the highest on record. Productivity of Atlantic Population Canada Geese on the Ungava Peninsula was good (above average) in 2008 (R. Cotter, pers. comm.; http://www.qc.ec.gc.ca/faune/sauvagine/html/can_goose_breeding.html)

In the boreal forest, where Canada Geese are counted as part of the Eastern Waterfowl Survey, the number of breeding pairs observed in 2008 was 15% higher than in 2007 (D. Bordage, pers. comm.). Estimates for the recent decade (1999–2008) clearly remain above those for the 1990–98 period. The region covered by the Eastern Waterfowl Survey is at the southern limit of the nesting range of AP Canada Geese.

Temperate-breeding Canada Goose in Eastern Canada.

This population of Canada Geese nests in southern Ontario and southwestern Quebec. There is also a growing population in New Brunswick, Nova Scotia and Prince Edward Island following deliberate re-establishment of local Canada Goose populations beginning in the late 1960s. Though sometimes referred to as "resident," many migrate as far north as James and Hudson bays and northern Québec during the moulting period, and may winter as far south as Virginia. The population has grown quickly and expanded its range. In turn, an increasing number are remaining to overwinter in southern Ontario (Dennis et al. 2000). In addition to the growing numbers breeding in Canada, temperate-breeding Canada Geese in the eastern United States have also increased rapidly, and large numbers of subadults and failed breeders move to Canada for the moulting period.

As recently as 1970, Canada Geese did not commonly nest in southern Ontario. However, results of a plot survey conducted on the ground and by helicopter show that the population south of the French and Mattawa rivers now exceeds 100 000 breeding pairs (J. Hughes, pers. comm.; Figure 34). An unknown, but increasing number of additional birds also breed locally north of the surveyed area. The estimated fall flight has increased from around 15 000 birds in the mid-1970s to well over 500 000 in recent years (J. Hughes, pers. comm.). The temperate-breeding population has been increasing at an average rate of approximately 8% per year since 1992.

Southern James Bay Population (SJBP) Canada Goose

The Southern James Bay Population (*B. c. interior*) of Canada Geese nest on Akimiski Island, Nunavut, in James Bay and in the adjacent lowlands of Ontario to the south and west. This population winters in an area extending from southern Ontario, Michigan and Ohio to Mississippi, Alabama and South Carolina (Figure 31a).

For some years there has been concern about the status of this population. From 1985 to 1988, mid-winter indices averaged about 154 000 birds, but in 1990 a spring breeding ground survey reported only about half that number. The spring population has been surveyed annually since then and there has been no real change in the size of the breeding population during the survey period.The total breeding population in 2008 was estimated at 110,409 (Figure 35).

Beginning in 2007 the objective of the survey was refocused to measure change in the population, rather than compare annual population estimates. A description of the modified survey design can be found in Brook and Hughes (2007a). The modifications increase the ability to detect population change, but also mean that population estimates since 2007 are not directly comparable to those of previous years.

Brook and Hughes (2008a) reported no significant change in indicated breeding pairs on Akimiski Island or on the mainland between the previous five-year average and 2008.

A heavier snow pack resulted in a later melt in 2008 compared to recent years, but nesting phenology was not greatly delayed. Above-average nesting effort followed by average hatch and brood-rearing conditions resulted in a good production of goslings in 2008. (Hagey et al. 2008).

Large numbers of moult-migrant temperate-breeding Canada Geese move to Akimiski Island and to adjacent coastal areas of James Bay and eastern Hudson Bay. On breeding areas they may compete for food resources with SJBP goslings and, as a result, contribute to the high gosling mortality that is observed there in some years (Abraham et al. 1999b).

Mississippi Valley Population (MVP) Canada Goose

The breeding range for the Mississippi Valley Population of Canada Goose (*B. c. interior*) extends from the Attawapiskat River in northern Ontario to the Nelson River in extreme northeastern Manitoba. This population winters largely in southern Wisconsin and Michigan, Illinois, western Kentucky and Tennessee (USFWS 2007a; Figure 31a).

A heavy snow pack and cold spring temperatures resulted in late breeding across the range and a lower than average nesting effort. While the spring population estimate in 2008 was 626 358, 4% above the 1989–2008 average (Figure 36). The estimated number of nesting birds in 2008 was only 305 190, a significant decline compared to the previous 5-year average (Brook and Hughes 2008b). A late spring snowstorm is thought to have contributed further to lowering productivity, particularly in the eastern portion of the range and a below average fall flight is expected (Hagey et al. 2008).

Eastern Prairie Population (EPP) Canada Goose

This Canada Goose population (*B. c. interior*) nests in the Hudson Bay lowlands of Manitoba. The birds overwinter in Manitoba, Minnesota and Missouri (USFWS 2008a, Raedeke et al. 2008; Figure 31b). Spring surveys of Eastern Prairie Population Canada Geese have been flown annually since 1972, providing good baseline data for this population.

After three years of early to average conditions, breeding phenology of the Eastern Prairie Canada Goose population was slightly delayed in 2008 (Raedeke et al. 2008).

In 2008, the spring population was estimated at 256 573 ± 33 599, above numbers for 2006 and 2007 but similar to the previous five-year average of 240 980 geese. The number of geese represented by singles (55 486 ± 9 796) was lower compared to 2007 (82 542 ± 11 997). The estimate of 105 619 geese in pairs was higher than in 2007 (70 900 ± 11 400), as were the numbers of geese observed in groups (95 468).

The two-year average of 157 272 singles and pairs is well above the 75 000 minimum threshold that would require more restrictive regulation (Raedeke et al. 2008).

Western Prairie Population (WPP)/Great Plains Population (GPP) Canada Geese

The Western Prairie Population (*B. c. interior, moffitti* and *canadensis*) breeds in eastern Saskatchewan and western Manitoba, while the Great Plains Population (*B. c. moffitti*) results from restoration efforts in Saskatchewan, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Both populations winter with other Canada Geese along the Missouri River in South Dakota, and on reservoirs from southwestern Kansas to Texas (Figure 31b).

Separate indices for these two populations are not available from mid-winter surveys, as the fall and winter ranges of the WPP and GPP overlap. During the 2008 midwinter survey, 669 500 WPP/GPP geese were counted, 50% above last year's estimate (USFWS 2008a).

Canada geese on the Canadian Prairies are also counted during the Waterfowl Breeding Population and Habitat Survey. A comparison of results from this survey and those of smaller-scale surveys in east-central Saskatchewan indicated that the spring waterfowl surveys provide a good measure of trends in populations (Nieman et al. 2000). Thus the annual Waterfowl Breeding Population and Habitat Survey could be used on an annual basis to assess the abundance of the various populations of large Canada Geese breeding on the Prairies (D. Nieman, pers. comm.). Results of spring waterfowl surveys in the Canadian Prairies indicated considerable increases (1027% and 2117%, respectively) in the populations of WPP and GPP Canada Geese between 1970 and 1999 (Nieman et al. 2000). The spring surveys in 2008 estimated 834 800 ± 122 700 geese, 8 % fewer than last year ($p = 0.422$); the spring estimates have increased an average of 5% per year since 1999 ($p = 0.004$) (USFWS 2008a).Wetland conditions in the Canadian WPP range varied from dry in the prairies to wet in the parklands. Goose abundance in South and North Dakota declined in 2008 according to the Waterfowl Breeding Population and Habitat Survey data but remained above the 10-year averages (USFWS 2008a).

Hi-Line Population (HLP) Canada Goose

The Hi-Line Population is composed of large Canada geese (*B. c. moffitti*) that nest in southeastern Alberta, southwestern Saskatchewan, eastern Montana and Wyoming, and in Colorado. This population winters in Colorado and in central New Mexico (Figure 31c).

In January 2008, the population numbered an estimated 269 300 geese, a 49% decline from 2007. Based on the mid-winter surveys, the number of HLP Canada Geese has increased an average of 3% ($p = 0.549$) per year since 1999 (USFWS 2008a).

HLP Canada Geese are also counted during the Waterfowl Breeding Population and Habitat Survey. Results of the surveys in the Canadian Prairies indicated a considerable increase (1089%) in the population between 1970 and 1999 (Nieman et al. 2000). The 2007 spring estimate was 298 800 (± 59 900) birds, about 43% higher than the previous year; there has been no annual trend during 1998–2007 (USFWS 2007a).

Rocky Mountain Population (RMP) Canada Goose

The Rocky Mountain Population (RMP) of Canada Geese nests in southern Alberta, the inter-mountain regions of Utah, Idaho, Nevada, Colorado, and Wyoming, and in western Montana. They winter in central and southern California, Arizona, Nevada, Utah, Idaho, and Montana (Figure 31c).

RMP Canada Geese are also counted during the Waterfowl Breeding Population and Habitat Survey. Spring waterfowl surveys in southern Alberta, southwestern Saskatchewan, and Montana provided an estimate of 210 400 geese, 48% more than in 2007 (USFWS 2008a). Results from the surveys in the Canadian Prairies indicated a considerable increase in the population (508%) between 1970 and 1999 (Nieman et al. 2000). After what appeared to be a declining trend since 2000, the RMP reached an all time high in 2008 (USFWS 2008a).

Pacific Population (PP) Canada Goose

The Pacific Population (PP) of Canada Geese nests and winters west of the Rocky Mountains from British Columbia south through the Pacific Northwest to California (Figure 31c). In Canada, this goose population breeds in central and southern British Columbia and it comprises both migratory and non-migratory (resident) segments. The breeding segment appears to have stabilized, at least in some areas.

Breeding Pacific Canada Goose are surveyed in the course of the two major surveys used to estimate trends in duck populations in British Columbia: the large-scale (11 million hectare) aerial survey of the B.C. Interior and the replicated series of ground counts covering selected wetlands of the Southern and Central Interior Plateau of B.C. Because of funding constraints and in response to changing program demands, ground counts were modified in 2007 to focus on managed and protected wetlands. Ground count results can no longer be used as a long-term index of Pacific Canada Goose abundance in the B.C. Interior and they are not reported here.

Aerial surveys of breeding waterfowl have been conducted in the Central Interior Plateau of British Columbia in May 2006 2007 and 2008 over an area covering in excess of 10 million hectares. The survey used a strip-transect total count method similar to the one used for the mid-continent breeding waterfowl survey, although all waterfowl sightings are georeferenced and associated with a unique habitat type (i.e. stream, wetland, river, lake, agricultural field) and ecological unit (ecosection) to allow for the subsequent determination of ecosystem-specific, habitat-to-species relationships and the development of landscape use models. Pacific Canada Goose population estimates are calculated separately for each ecosection and also for the entire survey area. We estimated the presence of 2 431 Pacific Canada Geese in the surveyed portion of the B.C. Interior in May 2008, 60% less than the 5 470 estimated in May 2007.

The non-migratory segment is concentrated in the urban and suburban areas of southwestern British Columbia (particularly the Greater Vancouver and Greater Victoria areas) and nearby agricultural lands (A. Breault, pers. comm.). Problem populations of resident and urban Canada Geese are primarily controlled by municipalities and through federal hunting regulations. Key management practices include egg addling (operational in the lower mainland of B.C. for over ten years), prevention of nesting, landscape management and relocation of moulting flocks to areas where they can be subjected to hunting mortality. Split hunting seasons have been successful in increasing the number of Canada Geese harvested in some agricultural areas and special permits are issued to protect crops and property (A. Breault, pers. comm.).

Lesser Canada Goose

Lesser Canada Geese (*B. c. parvipes*) breed throughout much of Alaska and migrate along the Pacific coast to winter in Washington, Oregon, and California (Figure 31c). As they winter with other populations of Canada Geese, there is no reliable mid-winter index for this population. Using breeding population survey data as an index, it is estimated that numbers of Lesser Canada geese and Taverner's Cackling Geese (*B. h. taverneri*) were 93 100, which was 25% higher than the 2007 estimate. These estimates have declined an average of 2% per year since 1999 (USFWS 2008a).

Short-grass Prairie Population (SGPP) Canada / Cackling Goose

The Short-grass Prairie Population of geese breeds in the western Arctic on Victoria and Jenny Lind islands, and on the Nunavut and N.W.T. mainland from Queen Maud Gulf to the Mackenzie River and south into northern Alberta. They winter in the dry agricultural lands of southeastern Colorado and northeastern New Mexico, and in the Oklahoma and Texas panhandles (Figure 31c). This population is thought to be comprised of two species of white-cheeked geese, the Lesser Canada Goose (*B. c. parvipes*) and Richardson's Cackling Goose (*B. h. hutchinsii*) (Hines et al. 2000).

Management concern has been expressed about this population, which has declined at a rate of 2% per year since 1999 ($p = 0.484$). Counts on the winter grounds provided an index of SGPP Canada geese in 2008 of 212 400, 12% higher than in 2007 (USFWS 2008a). In general, the declining counts on the wintering grounds (where different populations of Canada and Cackling geese are known to mix to varying degrees each year) do not appear to be compatible with surveys on the breeding grounds, which show increasing or stable populations.

Aerial transect surveys covering much of the breeding range of these Canada and Cackling geese populations in the Inuvialuit Settlement Region (ISR), on the mainland, and on Victoria and Banks Islands, were conducted in June 1989–1993 (Hines *et al.* 2000). Repeat surveys of many of these transects were carried out in 2002–2006. The aerial counts indicated that there were more than 70 000 SGPP Canada and Cackling geese in or near the survey area. However, the survey did not cover all of the breeding range of geese in the ISR. It was suspected that from 5 000 to 10 000 geese might not have been counted. Overall, the counts indicate that geese (predominantly *B. hutchinsii*) on Victoria Island and Banks Island have apparently increased in numbers and have possibly extended their breeding range northward over the past few decades. In contrast, results of spring waterfowl surveys suggested that SGPP Canada Geese in the boreal forest and taiga of the Northwest Territories, Yukon, and eastern Alaska had remained relatively stable since the 1960s (Hines et al. 2000).

The spring 2008 waterfowl surveys in the Western part of the Northwest Territories estimated 116 200 geese, a 35% decrease from 2007 (p=0.334). Estimates from the spring breeding survey have increased an average of 4% per year since 1999 (p=0.287) (USFWS 2008a). In most of the Arctic range of the SGP geese, May temperatures were 2-3 ^{O}C warmer than average, and June temperatures were near average. May snowfall was well below average near Cambridge Bay and Kugluktuk. Nesting phenology in the Queen Maud Gulf Sanctuary was reported as near average, and average goose production from that area is expected. Exploratory aerial surveys were conducted over western Victoria Island 19 June to 1 July 2008, and observers reported little snow cover and a good Canada goose nesting effort. Canada goose nesting effort in coastal areas of the western Canadian mainland was estimated as near average. Wetland conditions in boreal forest nesting areas were assessed as good. Although specic information is limited at this time, production from SGPP geese is expected to be improved from that of 2007 (USFWS 2008a). A recent analysis by Alisauskas (2002b) suggested that the mean expected lifespan of SGPP geese has been declining since the 1992 high of 7.1 years, to a 2000 estimate of 3.4 years. Annual survival has also dropped over that time period from 87% to 74%.

Tall Grass Prairie Population (TGPP) Cackling Goose

The Tall Grass Prairie Population of cackling Goose (*B. h. hutchinsii)* nests on Baffin (the Great Plains of the Koukdjuak), Southampton and King William islands, and on the Nunavut mainland primarily near the McConnell and Maguse rivers (western Hudson Bay). It winters in Oklahoma, Texas, and northeastern Mexico (USFWS 2008a; Figure 31b).

Aerial surveys of TGPP Cackling Geese were initiated in 1992 (Rusch et al. 1996) and, unlike other spring surveys, are conducted during the brood-rearing period. Population estimates available for Baffin Island from 1993 through 2007 indicate a population of about 100 000 breeding birds. Of the past several years of study, there were three years when almost no young were produced (1992, 1996, and 1999). TGPP Cackling Geese are also counted on the wintering grounds, but because they mix with other populations of Canada and Cackling Geese, it is difficult to estimate population size accurately. During the 2008 midwinter survey in the Central Flyway, 402 700 TGPP geese were counted, 41 % fewer than last year's record-high index. These estimates have increased an average of 5% per year during 1999–2007 (USFWS 2008a).

Brant

Based on breeding and wintering ranges, as well as on genetic differentiation, there are four distinct populations of Brant (*Branta bernicla*) recognized in North America (Reed et al. 1998b; see below). Compared to most other geese, Brant are more vulnerable to sporadic heavy losses from starvation and periodic nesting failures, because of their strong dependence on specific forage plants and the harsh environments where some populations live. This vulnerability requires careful regulation of hunting and monitoring of the status of populations (Reed et al. 1998b). Reed et al. (1998b) provide a review of the information available on this species in North America.

Atlantic Brant

This population of the subspecies *B. b. hrota* nests around Foxe Basin in the eastern low Arctic. It winters along the Atlantic Coast from Massachusetts to North Carolina (Reed et al. 1998b). Based on mid-winter counts in the Atlantic Flyway, there is great fluctuation in the population size of Atlantic Brant (Figure 38; Padding and Klimstra 2008). In 2008, the mid-winter population survey gave an estimate of 161 618 Atlantic Brant, up about 7% from the previous year, and 13% above the long-term (1961–2007) average of 139 933 birds. The population estimates have declined an average of 1% per year during the most recent ten-year period (p = 0.344)(USFWS 2008a).

Eastern High Arctic Brant

This group of *B. b. hrota* breeds on islands of the eastern high Arctic, migrating via Greenland and Iceland to winter in Ireland (Reed et al. 1998b). The number of Eastern High Arctic Brant is estimated through counts on the staging areas in Iceland and the wintering grounds in Ireland, where the population grew from fewer than 10 000 birds in the late 1960s to more than 33 000 in 2004–2005. The provisional results of the 2007 International Census estimated about 38 852 birds in the population. Numbers have increased by 30% since the previous year and reached their highest level to date (Wildfowl and Wetlands Trust 2008).

The percentage of young is assessed during the fall census. As is the case for most Arctic birds, productivity fluctuates markedly between years; only 1–2% of the population are comprised of young birds in poor years and as many as 20–30% in good years. Breeding success was particularly good in 2007, the proportion of young being the highest recorded since 2000/01 (21.0%). An increase in overall abundance is, therefore, not unexpected. Overall, the trend of this population is currently increasing.

Over the past five years, considerable information about migration and identification of important habitat areas has been obtained through satellite tracking of Eastern High Arctic Brant. That information is available at: http://www.wwt.org.uk/supergoose/

Black Brant

This population of brant (*B. b. nigricans*) nests in the central and western low Canadian Arctic, in Alaska and western Russia. It winters along the Pacific Coast, but mainly in Mexico (Reed et al. 1998b). Based on mid-winter counts in the Pacific Flyway, numbers of Black Brant are lower than in the early 1960s (Figure 39; Trost and Sanders, 2008). The January 2008 mid-winter index count was 147 363 birds, which was 12% higher than last year's estimate and above the long-term (1964–2008) average of 131 101, but still below the NAWMP goal of 150 000. Note that Black Brant numbers are obtained by subtracting Western High Arctic Brant counts in north Puget Sound (Padilla, Samish, and Fidalgo bays [Washington]; D. Kraege, pers. comm.) from the total mid-winter counts in the Pacific, and Black Brant counts could also include a small proportion of Western High Arctic Brant.

There are no regular surveys of their breeding grounds, but aerial surveys of Black Brant were conducted in June 1995–98 in the Inuvialuit Settlement Region. The results suggested that the total population of the Mackenzie Delta, Tuktoyaktuk Peninsula and Liverpool Bay likely exceeded 6 000 birds (Hines and Wiebe Robertson 2006). Preliminary mark-recapture and band-recovery estimates suggest that survival rates of adult Brant are relatively high (J. Hines, unpubl. data).

Part of the Black Brant population stages along the coast of British Columbia during spring migration. It is estimated that 3 000 to 7 000 brant stop over in the Queen Charlotte Islands on their way to northern breeding grounds. Roughly 25-30 000 Black Brant stage in the Strait of Georgia BC with the Fraser River delta and the Parksville-Qualicum area on Vancouver Island being the two most important sites. A statistical model was developed to estimate the volume (total number) of birds moving through the Strait (Hagmeier 2002, Hagmeier et. al. 2008).

Historically, large numbers of brant (1000 to 10 000) also wintered in British Columbia. Estimates of the wintering population in B.C. suggest over 1500 individuals are found at two locations including an estimated 600 to 700 individuals wintering in the Queen Charlotte Islands (Goudie and Hearne 1997; A. Breault, unpubl. data). In the Boundary Bay and Robert's Banks area of the Fraser River Delta, the wintering brant population has been generally increasing since 1992. The peak winter population was estimated at 1 264 brant during the winter of 2007–2008, lower than the 2 078 birds observed during the previous winter. Over 40 additional brant wintered on Vancouver Island in 2007-2008, and this small wintering population might be on the increase (A. Breault, pers. comm.). The reasons for the increase in the number of brant wintering in the Fraser River Delta is unknown, but is likely due to a combination of increased recruitment in the local population, a reduction in the sport harvest, and an influx of Western High Arctic Brant from Washington State (S. Boyd, pers. comm.).

Western High Arctic Brant

This population (also known as Gray-bellied Brant) is intermediate in appearance between *B. b. nigricans* and *B. b. hrota*, and is thought by some biologists to be a unique subspecies. It breeds on islands of the western high Arctic and winters in Puget Sound, Washington (Reed et al. 1998b). Mid-winter counts suggest relatively large fluctuations in the population size of Western High Arctic Brant (Figure39).

The Western High Arctic index count from Washington State for 2008 was 9 237 birds compared to 6 088 in the previous winter (Trost and Sanders, 2008; USFWS 2008a).

Western High Arctic Brant are of management concern given their limited number, potentially unique subspecies status, and restricted winter distribution. In 2005, WHA Brant were satellite-tagged on their moulting grounds in the Arctic. The resulting data were used to map southward and northward migration routes, timing of migration, important staging sites, and habitat use patterns at Izembek Lagoon AK, an important fall staging site. In addition to marking birds, blood sample were taken to test the degree of genetic distinctiveness of the Western High Arctic Brant from other brant stocks breeding and wintering in North America. DNA lab analyses have been completed but the results need to be summarized (S. Boyd, pers. comm).

Population Status of Swans

Two species of swans are native to Canada: the Tundra Swan (*Cygnus columbianus*) and Trumpeter Swan (*C. buccinator*).

Tundra Swan

There are two populations of Tundra Swans. The western population breeds along the coastal lowlands of western Alaska and migrates through Western Canada and along the Pacific Coast. This population winters primarily in California, Utah, and the Pacific Northwest. The eastern population of Tundra Swans breeds from the Seward Peninsula of Alaska to the northeast shore of Hudson Bay and Baffin Island, and migrates through the Prairie Provinces and Eastern Canada. This population winters in coastal areas from Maryland to North Carolina along the mid-Atlantic coast.

The 2008 mid-winter survey estimate of Eastern Population Tundra Swans was 96 200, which was a decline of 16% from 2007 (population counts previous 2008 have been revised – USFWS 2008a). This population steadily increased through the 1970s and 1980s, and during the 1990s fluctuated around 90 000 birds. These estimates decreased by an average of 2% per year during 1999-2008 (P = 0.231) (USFWS 2008a).

The Mackenzie Delta region and nearby parts of the Western Arctic mainland are one of the most important breeding areas for Tundra Swans in North America and support about one-third of the Eastern Population of this species. Surveys carried out in the region in June and August 2008 indicated good numbers of nesting swans and a relatively early nesting season. Overall, 61% of the indicated pairs nested and 61% of those nests produced broods, meaning that 37% of the pairs successfully raised broods. These estimates are above the long term average and well above those measured during 2001–2003 when the three parameters averaged 39%, 35% and 14%, respectively. Population counts of swans in the Mackenzie Delta region have paralleled the numbers counted on the wintering grounds of the Eastern Population. (J. Hines, pers. comm.).

The number of individuals from the eastern population killed and retrieved in the U.S. in 2007 was 3 366, unchanged from the previous year and about equal to the long-term average (3 230 birds annually from 1983 to 2005) (Kruse 2008). In 2007, 1 367 swans from the western population were killed and retrieved, slightly above the long-term average of 1 118 (Kruse 2008). There are no open seasons for Tundra Swans in Canada.

A migration study using satellite transmitters (Petrie and Wilcox 2003) demonstrated that eastern Tundra Swans migrated between the wintering areas on the Atlantic coast and staging points in the northern prairies along a narrow corridor passing through the southern Great Lakes. From there, three major routes were followed to breeding areas in western Hudson Bay, the central High Arctic and the Mackenzie River Delta.

Trumpeter Swan

There are three populations of Trumpeter Swans: the Pacific Coast Population, the Rocky Mountain Population, and the Interior Population. The size of each of those populations is assessed at five-year intervals across their entire range in North America. The most recent of those surveys was conducted in August–September 2005 (every 5 years). Analyses of the 2005 data indicate that Trumpeter Swan breeding populations were at a record-high level in Alberta, British Columbia and the Yukon (Moser 2006).

Over 40% of the continental population of Pacific Coast Trumpeter Swans winters on the coastline, wetlands and agricultural fields of Vancouver Island and the Fraser River Valley; this is the largest wintering Trumpeter Swan population in North America. Aerial surveys of the area's wintering population are conducted every three years over this entire area, to identify regional and habitat-specific trends in swan use. During the most recent survey in January and February 2006, estuaries, coastal marshes, farmland and freshwater lakes were the most important wintering sites on Vancouver Island, and swans were distributed almost equally between tidal marshes and upland habitats in the Fraser River Valley. The survey estimated a total of 7 570 swans, an 11.7% decrease over the 6 775 swans observed in 2000–2001. During the 2007–2008 survey of snow geese in the Fraser River Delta, swan groups were either counted (< 20) or photographed. Pictures were subsequently analyzed for total count and percentage of young. The 2007–2008 surveys estimated the presence of 497 swans in the Fraser River Delta, 20% below the previous year's count and 26% below the long-term average (1987–2006) of 670 swans. Tundra and Mute swans each accounted for less than 0.5% of all the swans seen (CWS and Ducks Unlimited Canada, unpubl. data).

Between 1999 and 2007, roughly 2 100 Trumpeter Swans died of lead poisoning (the major cause of death was ingested lead shot [A. Breault, pers. comm.]) in the Fraser River Valley and in adjacent areas of Washington State. Nearly 100 Trumpeter Swans died in 2007–2008 (L. Wilson, pers. comm.). Lead poisoning losses are responsible for some of the decline in the number of wintering Trumpeter Swans observed since 1998. International efforts overseen by the Washington Department of Fish and Game and the Canadian Wildlife Service were initiated in 2001 to locate the source(s) of lead. These efforts have focused on population surveys conducted by volunteers, trapping and telemetry of banded birds to characterize habitat use, monitoring roost sites to track and collect sick bird post-mortem examinations of dead birds to confirm the cause of death and, more recently, the hazing of birds away from Judson Lake.

In Ontario, a re-introduction program begun in 1982 has now achieved its goal of at least 500 free-living swans (H. Lumsden, unpubl. data). Surveys conducted in 2005 as part of the continental five-year survey of Trumpeter Swans showed a total population of 644 swans in Ontario (Moser 2006). Releases of captive-bred swans continued in 2006, although there were no new releases in 2007, and the entire captive-breeding program is expected to wind down over the next few years.

Population Status of Other Hunted Migratory Birds

Thick-Billed and Common Murres

Thick-billed Murres (*Uria lomvia*) and Common Murres (*U. aalge*) have traditionally been hunted off the coast of Newfoundland and Labrador. Murres have a limited ability to rebuild their numbers, as they first breed only at the age of four or five and then lay only one egg each year. If over-harvested, murre populations would take a long time to recover.

An analysis in the early 1990s of the demography of murres and the impacts of harvesting suggested that the annual harvest was unsustainable at that time. The number of Thick-billed Murres in the northwest Atlantic has been estimated to be close to 2.0 million pairs in the Canadian Arctic and 375 000 breeding pairs in Greenland (Petersen et al. 2008). The number of Common Murres breeding in Newfoundland and Labrador had been estimated to be 600 000 pairs (S. Gilliland, pers. comm.).

Since the 1970s, Thick-billed Murre numbers in selected colonies in the Eastern Canadian Arctic have been monitored by counts of occupied breeding sites on fixed study plots scattered throughout. During the period 1976–2000, trends in these monitoring counts were generally either stable or positive (up 1 to 2% per year; $p < 0.01$), except for a sharp fall in numbers in 1989 and 1990 ($p < 0.01$). A sharp drop in population occurred between 2000–2002, with indices at two colonies falling by 25% ($p < 0.01$) and 9% ($p < 0.05$). Since then, after a partial recovery in 2003, the population indices have remained more or less stable to 2007. The cause of these population fluctuations is not known, but is probably related to events in the wintering grounds rather than the breeding grounds (Gaston 2003). Similar trends have been seen in Common Murres breeding in southern Newfoundland at Cape St. Mary's, with declines throughout the 1980s and increases since 1989 (P. Regular, pers. comm.).

Recovery rates of juvenile Thick-billed Murres between 1984 and 2004 ranged from 0.0 to 2.6% and have declined in recent years. From 2001 to 2008 juvenile Common Murre recovery rates have ranged from 0.0 to 2.5% for Newfoundland colonies and from 1.7 to 5.2% for Labrador colonies. Breeding adult recovery rates are very low for Thick-billed Murres (3 of 2345 banded from 1984–2002 or 0.1%) and Common Murres (0 of 385 banded from 2001–2007). Consequently, apparent survival rates of breeding adult Common Murres between 1996 and 2003 were high (93–97%; Robertson et al. 2006).

Beginning in the 1993–94 hunting season, CWS implemented restrictions on murre hunting in Newfoundland and Labrador. The restrictions were designed to reduce the harvest of murres by up to 50%, to eliminate excessive kills that lead to illegal sale, and to provide additional protection to other seabirds such as razorbills (*Alca torda*). These interim restrictions had been taken while steps were underway to amend the *Migratory Birds Convention Act* between Canada and the United States. Beginning with the 2000–2001 hunting season, an amendment to the Convention now enables murres to be managed through the usual regulatory approaches.

The annual murre harvest has been estimated several times since the 1977–78 hunting season using a special survey mailed to Migratory Game Bird Hunting Permit holders. Overall, the murre harvest has declined since the late 1970s, with estimates being the lowest in the last three surveys, following the imposition of hunting restrictions. Excluding the very high estimate for 1982–83, the average harvest estimate for permit holders prior to the introduction of the hunting restrictions was about 400 000 birds per year, compared to 134 000 birds per year after the restrictions. Thus, the annual harvest was reduced by about 66%, exceeding the target of 50%. Accounting for murre hunters who, until 2000, were not required to purchase a hunting permit, the total annual harvest of murres was assessed at about 250 000 to 300 000 birds between 1996 and 1998, compared to 600 000 to 900 000 birds prior to the hunting restrictions.

The hunting season of 2001–2002 was the first year when all murre hunters were required to purchase a hunting permit, and hence the first year that the total murre harvest could be estimated. The results indicated that there were about 6 400 murre hunters in Newfoundland and Labrador in 2001–02, of which about 18% bought permits just to hunt murres. In 2002–2003, the estimate was essentially unchanged at about 6500 hunters. The total estimated harvest for 2001–2002 was about 186 000 murres, while the harvest was an estimated 158 000 birds in 2002–2003 (Collins and Gobeil 2003). Murres are now captured on the National Harvest Survey, and late season mail-outs should allow better estimation of the harvest. In 2006-2007, 85,000 murres were estimated to have been harvested in Newfoundland and Labrador (M. Gendron, pers. comm.).

American Woodcock

The status of American Woodcock (*Scolopax minor*) in North America is monitored through the Singing-ground Survey, which consists of a spring count of male courtship displays at dusk. Counts of singing males provide indices to American Woodcock populations and can be used to monitor annual population changes (Cooper et al. 2008). The survey covers the central and northern portions of the woodcock breeding range. Analyses of band recoveries indicate that there are two relatively discrete populations, and as a result, American Woodcock are managed on the basis of two regions: Eastern and Central. In Canada, woodcock breeding in Manitoba and Ontario belong to the Central Population, while those breeding in Quebec and in the Maritimes are part of the Eastern Population.

Population indices for 1968 to 2007 have been revised (Cooper et al, 2008); for the first time, results of trend were estimated using hierarchial modeling methods (Sauer et al., 2008). The numbers of American Woodcock displaying during the 2008 singing ground survey in the Central Region declined 9.2 % from 2007 levels. There was no change in the Eastern Region (Cooper et al, 2008). The 10-year trend (1998-2008) remained unchanged for the Eastern Region for the fifth consecutive year, while, for the first time since 2003, there was a significant decline of 1.5% per year for the Central Region. (Cooper et al. 2008; Figure 40).

In Canada, there were no significant trends (short, medium or long term) in the number of American Woodcock estimated in Ontario, Quebec, New-Brunswick, Nova Scotia or Prince Edward Island The major causes for American Woodcock population declines are believed to be degradation and loss of suitable habitat on both the wintering and breeding grounds.

An indirect measurement of recruitment or annual productivity, of woodcock breeding populations is derived from age ratios of wings collected from the harvest (*Wing-collection Survey*).

The 2007 recruitment index of 1.8 in Canada (i.e. Ont., Que., NB and N.S.) was similar to the previous year's estimate of 1.9, but lower than the long-term average of 2.3 (1991–2007), and the lowest recorded index since 1995. The 2007 recruitment index in the U.S. portion of the Eastern Region (1.6 immatures per adult female) was 4.2% higher than the 2006 index (1.5), and 3.6 % lower than the long-term (1963-06) regional average. In the Central Region, the 2007recruitment index (1.5 immatures per adult female) was 9.7 % lower than the 2006 index (1.6) and was 7.6 % lower than the long-term regional average ((Cooper al. 2008).

The harvest of American Woodcock in Canada and the U.S. has been declining over the years; this decline, however, was much more pronounced in the United States until recently (Figure 41). In 2007, there were 25 975 woodcock harvested in Canada, which was a decline of 28% from 2006 (Figure 41). The number of woodcock hunters in Canada is undergoing a long-term decline, from about 20 000 in the late 1970s to about 5 000 at present. In the U.S., the 2007 harvest was estimated at 290 045 woodcock, a slight decline over the harvest of 310 590 in 2006. .

Mourning Dove

Mourning Doves (*Zenaida macroura*) are among the most widely distributed and abundant birds in North America, and are monitored in Canada through the Breeding Bird Survey (C. Downes; http://www.cws-scf.ec.gc.ca/mgbc/trends/index.cfm?lang=e&go=home.page&CFID=10699963&CFTOKEN=36995251).

Mourning Dove populations in the Lower Great Lakes/St. Lawrence Plain, and Atlantic Northern Forest ecozones have increased significantly ($p < 0.05$) over the long term (1968–2007). Populations in the Boreal Taiga Plains, the Boreal Softwood Shield, Great Basin, Northern Rockies, Prairie Potholes and Boreal Hardwood Transition ecozones do not show any significant trend over that time period. During the last ten years, mourning doves in the Boreal-Hardwood Transition, Lower Great Lakes/St. Lawrence Plain, and the Atlantic Northern Forest have been increasing significantly ($p < 0.05$).

In the U.S., Mourning Dove populations are monitored through the Mourning Dove Call-count Survey, which has been developed to provide an annual index to population size during the breeding season (Dolton et al. 2008). Mourning Doves in the U.S. are managed on the basis of the three regions where dove populations are largely independent. These areas are referred to as the Eastern, Central, and Western Management Units. Over the long-term (1966–2007) the Eastern Unit experienced a significant average annual increase of 0.5 % per year in the number of doves seen and heard, whereas the Central and Western Units exhibited significant declines of -0.4% and -0.6%, respectively. No significant trends were observed over the most recent decade (Dolton et al. 2008).

Dove hunting is permitted in several states in each of the three Management Units in the United States. In Canada, Mourning Doves are hunted only in British Columbia. The harvest in British Columbia has varied considerably from year to year, ranging from an estimated high of 5391 doves killed in 1977 to 162 during the 2005 season. The long-term decline in Mourning Doves in southern British Columbia resulted in the implementation of hunting restrictions beginning in 1994. The preliminary estimate of harvest in the U.S. in 2007–2008 season was 20 550 000 ± 5% (Dolton et al. 2008).

Wilson's (Common) Snipe

Wilson's Snipe (*Gallinago delicata*) in Canada are also monitored through the Breeding Bird Survey (C. Downes; http://www.cws-scf.ec.gc.ca/mgbc/trends/index.cfm?lang=e&go=home.page&CFID=10699963&CFTOKEN=36995251). Populations of Wilson's Snipe in the Prairie Potholes ecozone have increased significantly ($p < 0.05$) over the long term (1968–2007). Populations in the Atlantic Northern Forest ecozone showed a significant decline over this same time period. No long-term trends were observed elsewhere in the country. Wilson's Snipe declined significantly over the last decade (1997–2007) in the Great Basin ecozone, whereas it increased significantly in the Prairie Pothole ecozone during the same period. The harvest of this species in Canada has also been declining over the years (Figure 42). In 2007, there were 8 817 (± 1 863) snipe harvested in Canada, up 5% from 2006. The estimated harvest in the U.S for 2007 increased substantially (by 56%) to 119 400 from the previous year's estimate of 76 7000 (USFWS 2008b).

Sandhill Crane

The Mid-continent Population of Sandhill Cranes is the largest of all North American crane populations. This population is comprised of approximately two-thirds Lesser (*Grus canadensis canadensis*), one-fourth Canadian (*G. c. rowani*), and the remainder Greater Sandhill Cranes (*G. c. tabida*). Mid-continent Sandhill Cranes breed from southern Ontario northwestward through the Arctic, Alaska, and into eastern Siberia. This population winters in western Oklahoma, eastern New Mexico, Texas, southward into Mexico, and westward into Arizona (Kruse et al. 2008).

The Mid-continent Population of Sandhill Cranes is monitored through a spring aerial transect survey. Indices corrected for visibility bias are available since 1982. The population index in spring 2008, so far uncorrected, was 414 018 (Kruse et al. 2008) (Figure 43). The annual photo-corrected estimates and 95% confidence intervals for the Central Platte River portion of the survey indicate a relatively stable population trend for the MCP since 1982 (Kruse et al. 2008). The average index for photo-corrected counts during 2005–2007 is 413 881 cranes, which remains within the management threshold objective levels (349 000–472 000 cranes) (Kruse et al. 2008).

The Canadian hunting season for Mid-continent Sandhill Cranes is currently open only in Manitoba, Saskatchewan, and the Yukon Territory. The crane harvest in Canada has been quite variable, tending toward an increase in Saskatchewan in recent years (Figure 44). The overall Canadian harvest of Mid-continent Sandhill Cranes was 11 785 in 2007, which is at par with annual harvest levels over the past decade (Figure 44). The harvest of Mid-continent Sandhill Cranes increased by 8% to 19 805 in 2007 compared to the previous year (Figure 44; Kruse et al. 2008).

Band-tailed Pigeon

Limited information is available on the status of the Band-tailed Pigeons (*Columba fasciata*) found in forested habitats of coastal British Columbia. This species has a very low reproductive rate of one egg per pair, but some nest twice each season. Results from the Breeding Bird Survey (C. Downes;, http://www.cws-scf.ec.gc.ca/mgbc/trends/index.cfm?lang=e&go=home.page&CFID=10699963&CFTOKEN=36995251) indicate no significant trend in the population over the long term (1968–2007) or in the last ten years (1997–2007).

As an alternative mechanism by which to understand population trends in Band-tailed Pigeons, in 2001 the species was assessed at over 15 mineral sites for which there were historic records for comparison. These counts were integrated into a Flyway-wide index of use of mineral sites, including California, Washington, Oregon and British Columbia (Casazza and Pacific Flyway Band-tailed Pigeon Sub-committee, pers. comm.). Preliminary analyses of the data collected at four mineral sites in British Columbia in the summer of 2008 suggest a 53% decline over the 2007 numbers and a 32% decline over the 2001–2007 average (A. Breault, pers. comm.).

The Canadian hunting season for this species was closed from 1994 through 2001. Population increases in Washington State were primarily responsible for the limited opening implemented in British Columbia in 2001 (where the bag limit was reduced from ten birds to five and the season length reduced from 30 to 15 days). The harvest estimate for Band-tailed Pigeon was 197 ± 76 in 2007 in Canada. The harvest continues to decline, in comparison to the early 1970s when between 3 000 and 5 000 were harvested annually. The estimated total U.S. harvest for 2007 was 17 600 Band-tailed Pigeons (USFWS 2008b).

American Coot

American Coots (*Fulica americana*) are also recorded in the Canadian Prairies as part of the Waterfowl Breeding Population and Habitat Survey. Results of this survey show that American Coot population estimates have fluctuated greatly over the duration of the survey (Figure 45). In recent years, however, the population has maintained itself at substantially higher levels than during the 1980s and early 1990s. The 2008 population estimate of 2.4 million coots is an increase of 26% over the previous year (1.9 million; Canadian Wildlife Service Waterfowl Committee 2008).

The harvest of American Coots in Canada has fallen considerably over time. However, in 2007, the American Coot harvest was estimated at slightly above 3 745, an increase of 6 % from the previous year. The total harvest in the U.S. in 2007 was an estimated 198 300 (USFWS 2008b), about the same as in 2006.

Rails

Although rails are counted during the Breeding Bird Survey (BBS), their sometimes secretive nature and infrequent calling means they are likely to be missed during the BBS. The results of trend analyses should therefore be viewed with caution (C. Downes; http://www.cws-scf.ec.gc.ca/mgbc/trends/index.cfm?lang=e&go=home.page&CFID=10699963&CFTOKEN=36995251).

There is sufficient sample size to estimate trends for Virginia Rails (*Rallus limicola*) for the country as a whole and in all four time periods (1968–1987, 1968–2007, 1985–2007and 1995–2007), as well as long-term trends in the Boreal Hardwood Transition, and long-term and for the last 20-year trends in the Lower Great Lakes/St. Lawrence Plain. However, none of these trends is significant. Sora (*Porzana carolina*) trends are available for the Boreal Taiga Plains, Great Basin, Northern Rockies, Prairie Potholes, Boreal Hardwood Transition, Great Lakes/St. Lawrence Plain and Atlantic Northern Forest ecozones. Sora population indices showed a significant long-term increase in the Atlantic Northern Forest. Trends are not reliable for the Yellow Rail (*Coturnicops noveboracensis*) or King Rail (*Rallus elegans)* because of relatively low numbers observed or heard during the surveys.

The only province with an open season on hunting rails is Ontario (excluding King Rails and Yellow Rails). Other provinces previously held seasons but they have been closed in recent years. The collection of harvest data for rails began in 1989 as part of the National Harvest Survey. Since that time, between 100 and 4000 rails have been harvested annually, with an estimate of 106 in 2007.

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Appendices

APPENDIX A - *Special Conservation Measures for Spring 2009*

MEASURES IN QUEBEC CONCERNING OVERABUNDANT SPECIES

Item	Column 1 Area	Column 2 Period during which Snow Geese may be killed	Column 3 Additional hunting method or equipment
1.	District A	May 1 to June 30 and	Recorded bird calls (*d*), (*f*)
2.	District B	None	
3.	Districts C and D	April 1 to May 31 (*a*),	Recorded bird calls (*d*), (*f*)
4.	District E	April 1 to May 31 (*a*),	Recorded bird calls (*d*), (*f*)
5.	Districts F	April 1 to May 31 (*a*), (*b*), (*c*),	Recorded bird calls (*d*), (*f*)
6.	District G	None	

(*a*) Hunting and hunting equipment are allowed only on farmland.

(*b*) In District F, no person shall hunt south of the St. Lawrence River and north of the road right-of-way of Route 132 between Forgues Street at Berthier-sur-Mer and the eastern limit of Cap-Saint-Ignace municipality.

(*c*) In District F, on the north shore of the St. Lawrence River, no person shall hunt north of the St. Lawrence River and south of a line located at 1000 m north of Highway 40 between Montée St-Laurent and the Maskinongé River. On the south shore of the St. Lawrence River, no person shall hunt south of the St. Lawrence River and north of the railroad right-of-way located near Route 132 between the Nicolet River in the east and Lacerte Road in the west.

(*d*) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(*e*) Hunting with bait or in a bait crop area is permitted if the Regional Director has given consent in writing pursuant to section 23.3.

(*f*) The decoys used when hunting with recorded Snow Goose calls must represent only white-phase Snow Geese in adult or juvenile plumage (white or gray).

MEASURES IN MANITOBA CONCERNING OVERABUNDANT SPECIES

	Column 1	Column 2	Column 3
Item	Area	Period during which Snow Geese may be killed	Additional hunting method or equipment
1.	Zone 1	April 1 to May 31	Recorded bird calls (*a*) (b)
2.	Zone 2	April 1 to May 31	Recorded bird calls (*a*) (b)
3.	Zone 3	April 1 to May 31	Recorded bird calls (*a*) (b)
4.	Zone 4	April 1 to May 31	Recorded bird calls (*a*) (b)

(*a*) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(*b*) If decoys are used when hunting with recorded Snow Goose calls, the decoys must represent white or blue phase Snow Geese.

MEASURES IN SASKATCHEWAN CONCERNING OVERABUNDANT SPECIES

	Column 1	Column 2	Column 3
Item	Area	Period during which Snow Geese may be killed	Additional hunting method or equipment
1.	East of 106° W Longitude	April 1 to May 31	Recorded bird calls (*a*) (b)
2.	West of 106° W Longitude	April 1 to April 30	Recorded bird calls (*a*) (b)

(*a*) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(*b*) If decoys are used when hunting with recorded Snow Goose calls, the decoys must represent white or blue phase Snow Geese.

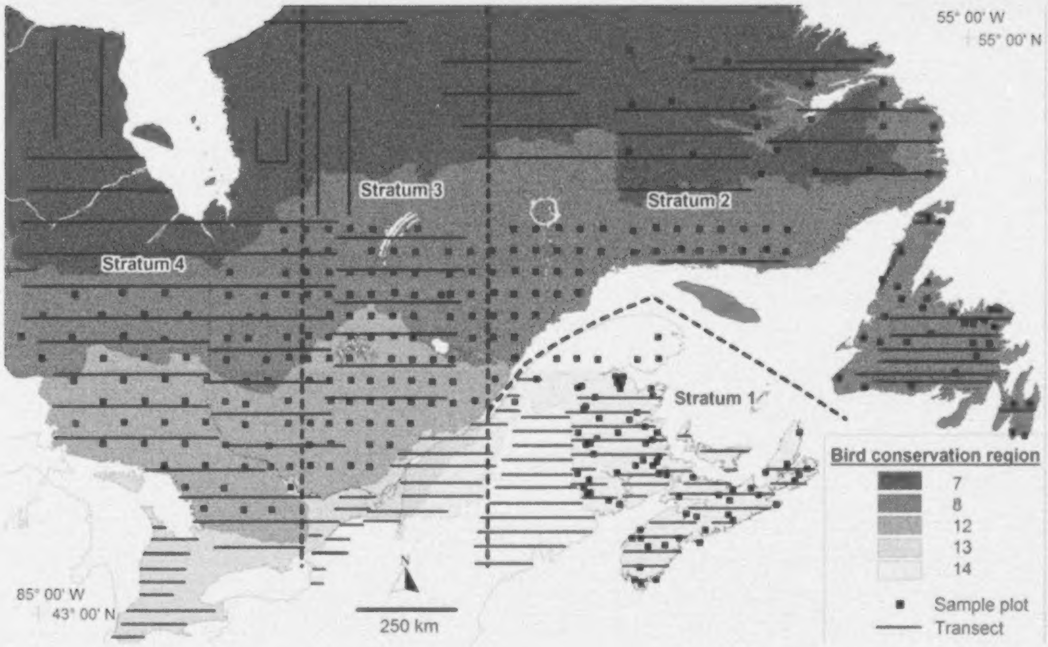
MEASURES IN NUNAVUT CONCERNING OVERABUNDANT SPECIES

	Column 1	Column 2	Column 3
Item	**Area**	**Period during which Snow Geese may be killed**	**Additional hunting method or equipment**
1.	**Throughout Nunavut**	**May 1 - June 7**	**Recorded bird calls (*a*)(*b*)**

(a) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(*b*) If using decoys when hunting with recorded snow goose calls, decoys must be white.

Figures



55° 00' W
55° 00' N
Stratum 3
Stratum 2
Stratum 4
Stratum 1
Bird conservation region
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14
■ Sample plot
— Transect
85° 00' W
43° 00' N
250 km
N

Figure 1. Eastern Waterfowl Survey Area in Eastern Canada
(Source: C. Lepage and M. Melançon)

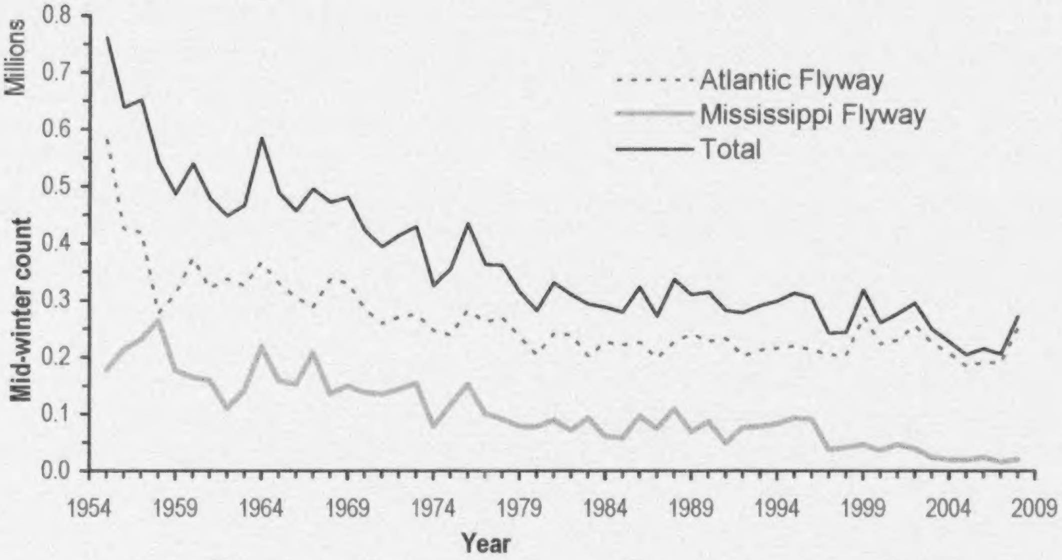

Figure 2. American Black Ducks in the Atlantic and Mississippi Flyways in Mid-winter
Survey results in the Atlantic Flyway for 2001 and in the Mississippi Flyway
for 1993 and 1998 were incomplete in some states.

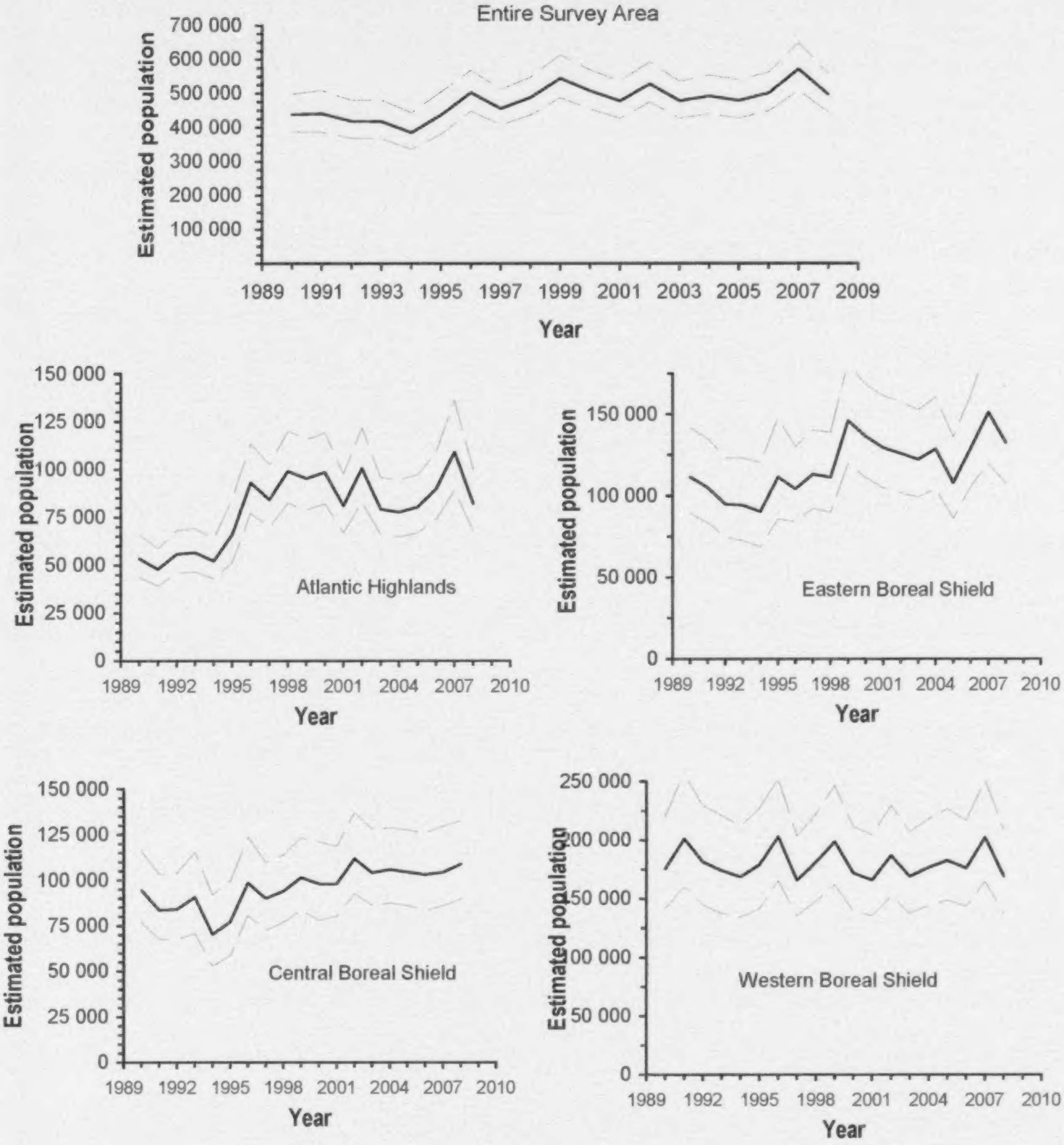

Figure 3. American Black Ducks in the Eastern Waterfowl Survey area
Estimated number of indicated birds, with 90% confidence limits. The figures represent the combined results of helicopter and fixed-wing aircraft surveys.

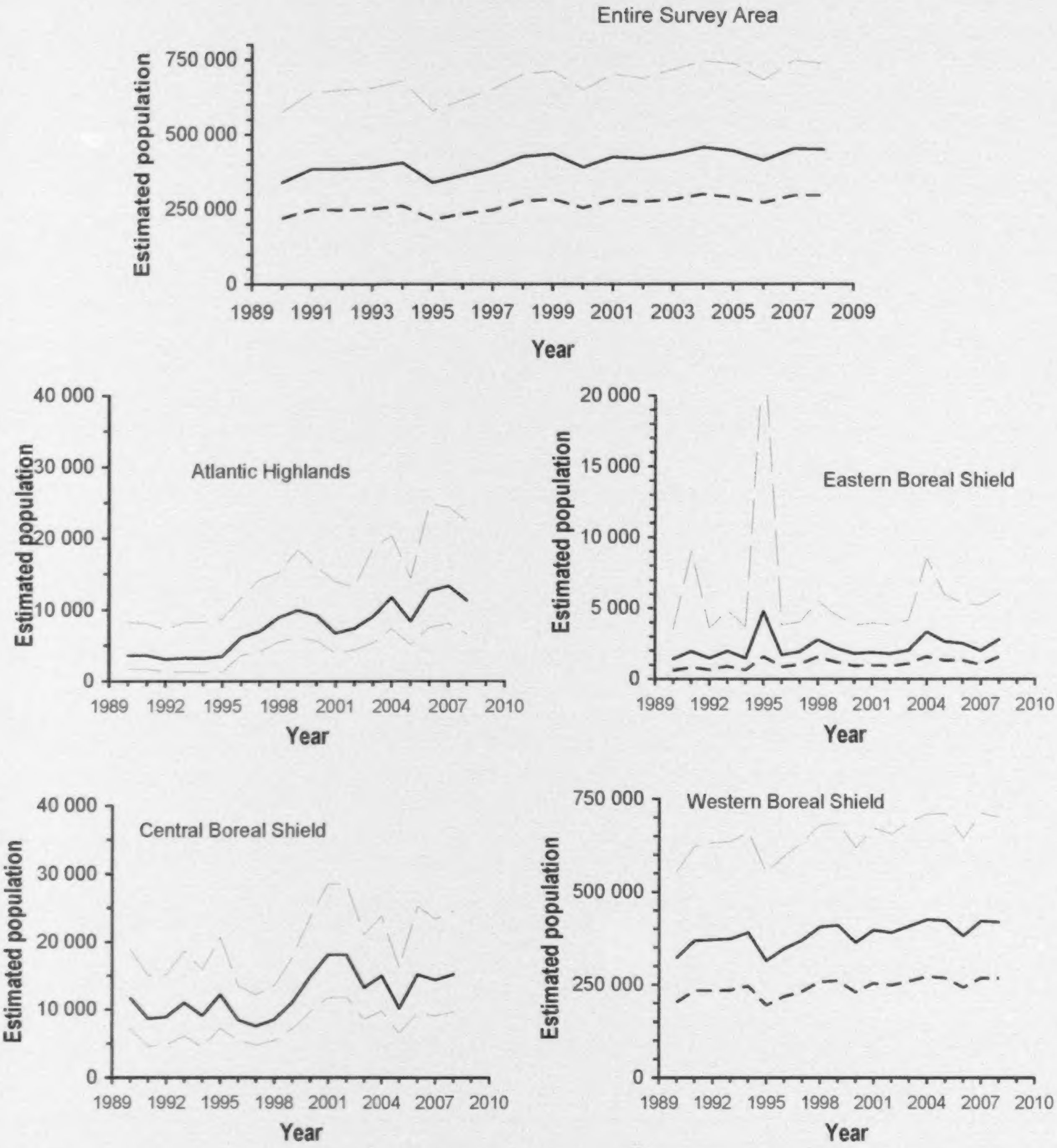

Figure 4a. Mallards in the Eastern Waterfowl Survey area
Estimated number of indicated birds, with 90% confidence limits. The figures represent the combined results of helicopter and fixed-wing aircraft surveys.

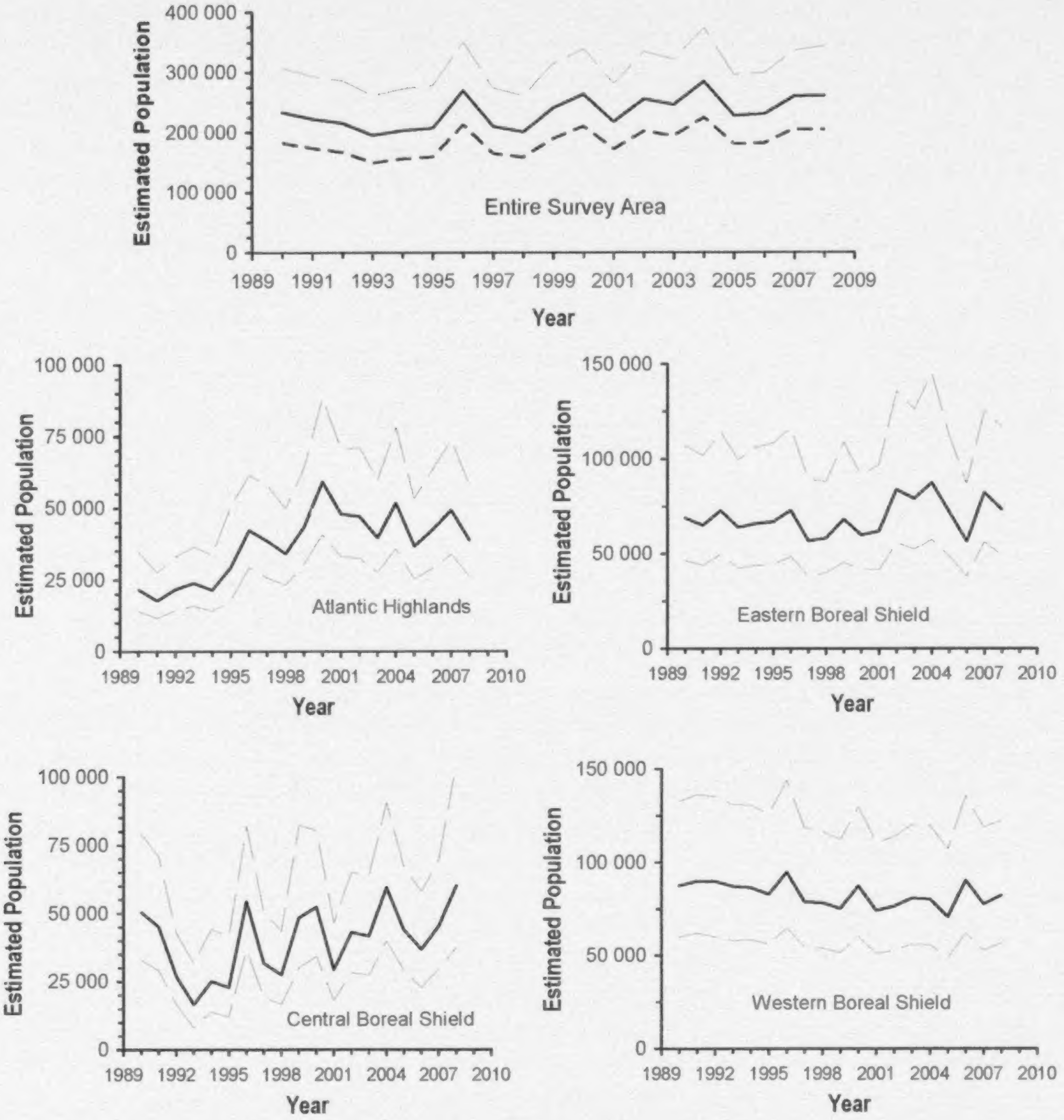

Figure 4b. American Green-winged Teal in the Eastern Waterfowl Survey area
Estimated number of indicated birds, with 90% confidence limits. The figures represent the combined results of helicopter and fixed-wing aircraft surveys.

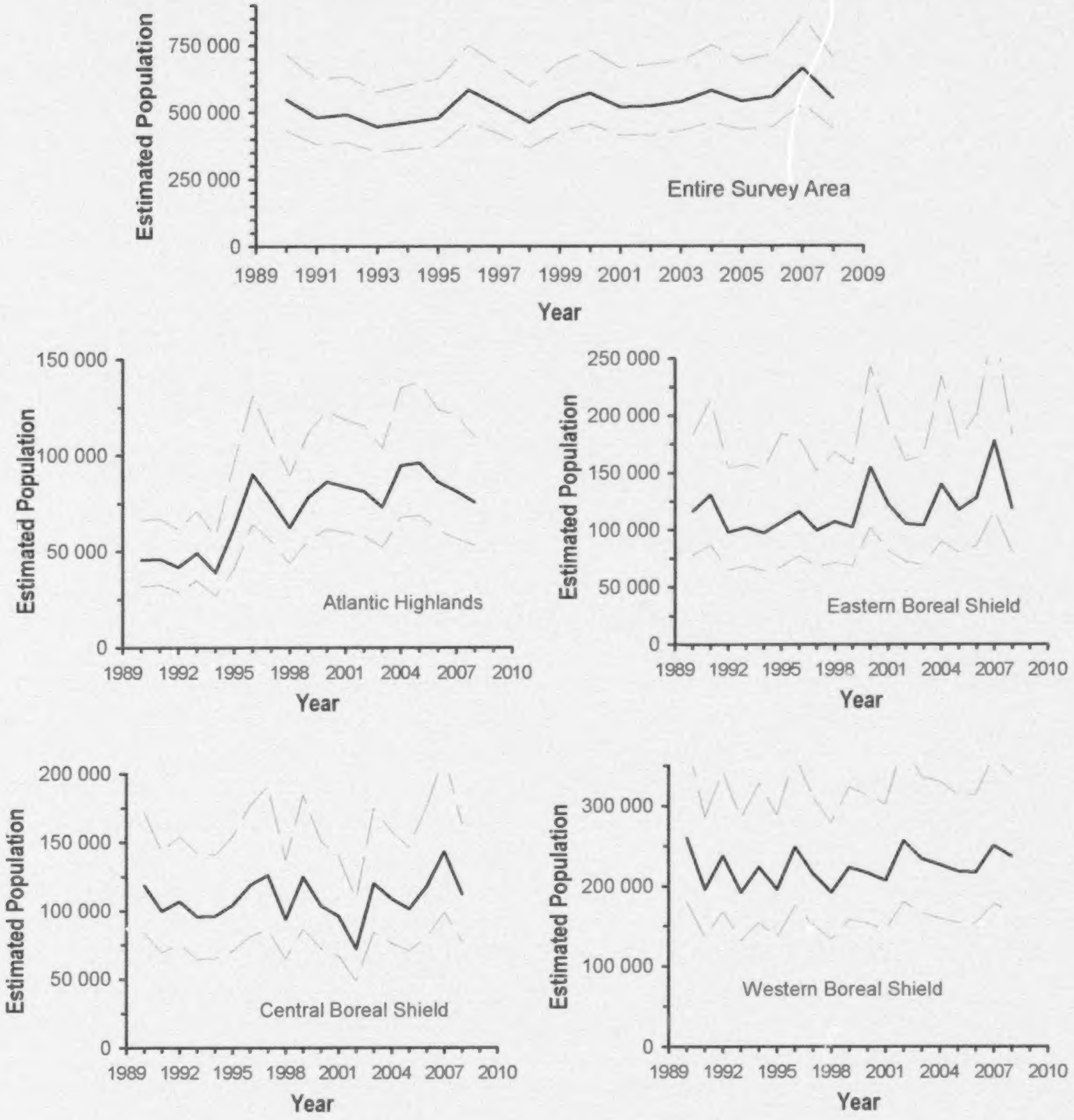

Figure 4c. Ring-necked Ducks in the Eastern Waterfowl Survey area

Estimated number of indicated birds, with 90% confidence limits The figures represent the combined results of helicopter and fixed-wing aircraft surveys.

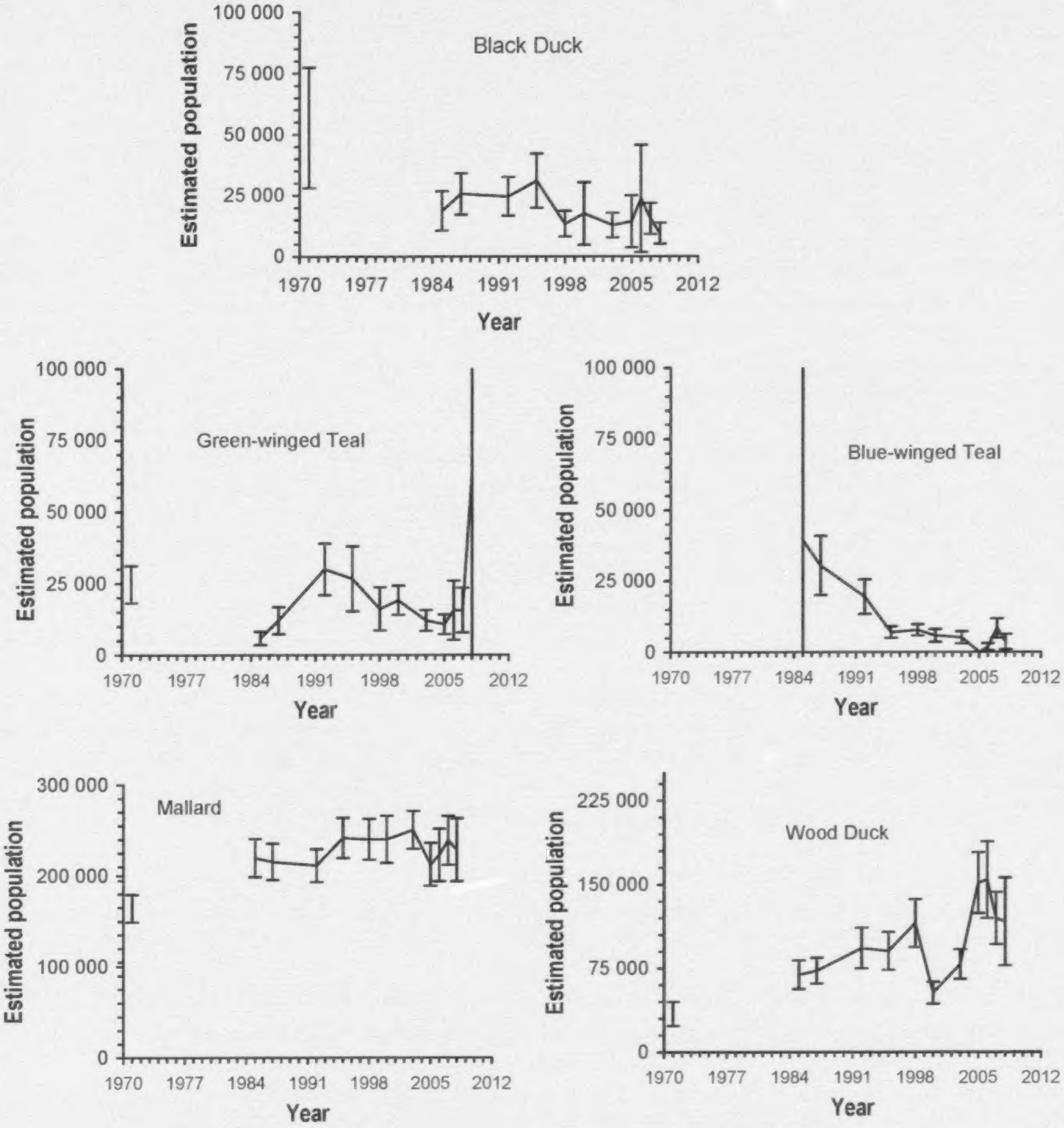

Figure 5a. Estimated Breeding Pairs (±1 SE) of Dabbling duck species in Southern Ontario, 1971-2008

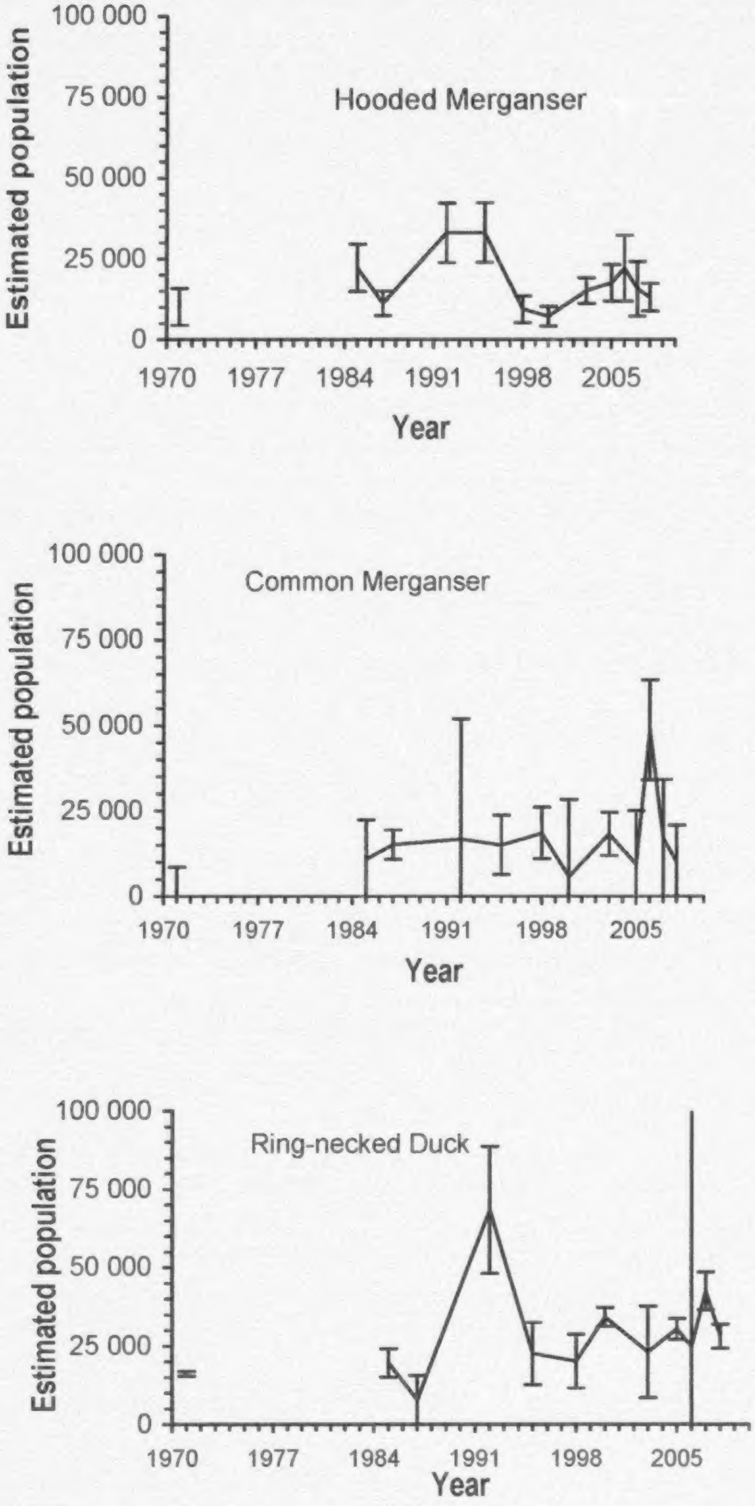

Figure 5b. Estimated Breeding Pairs (±1 SE) of
Diving duck species in Southern Ontario, 1971-2008

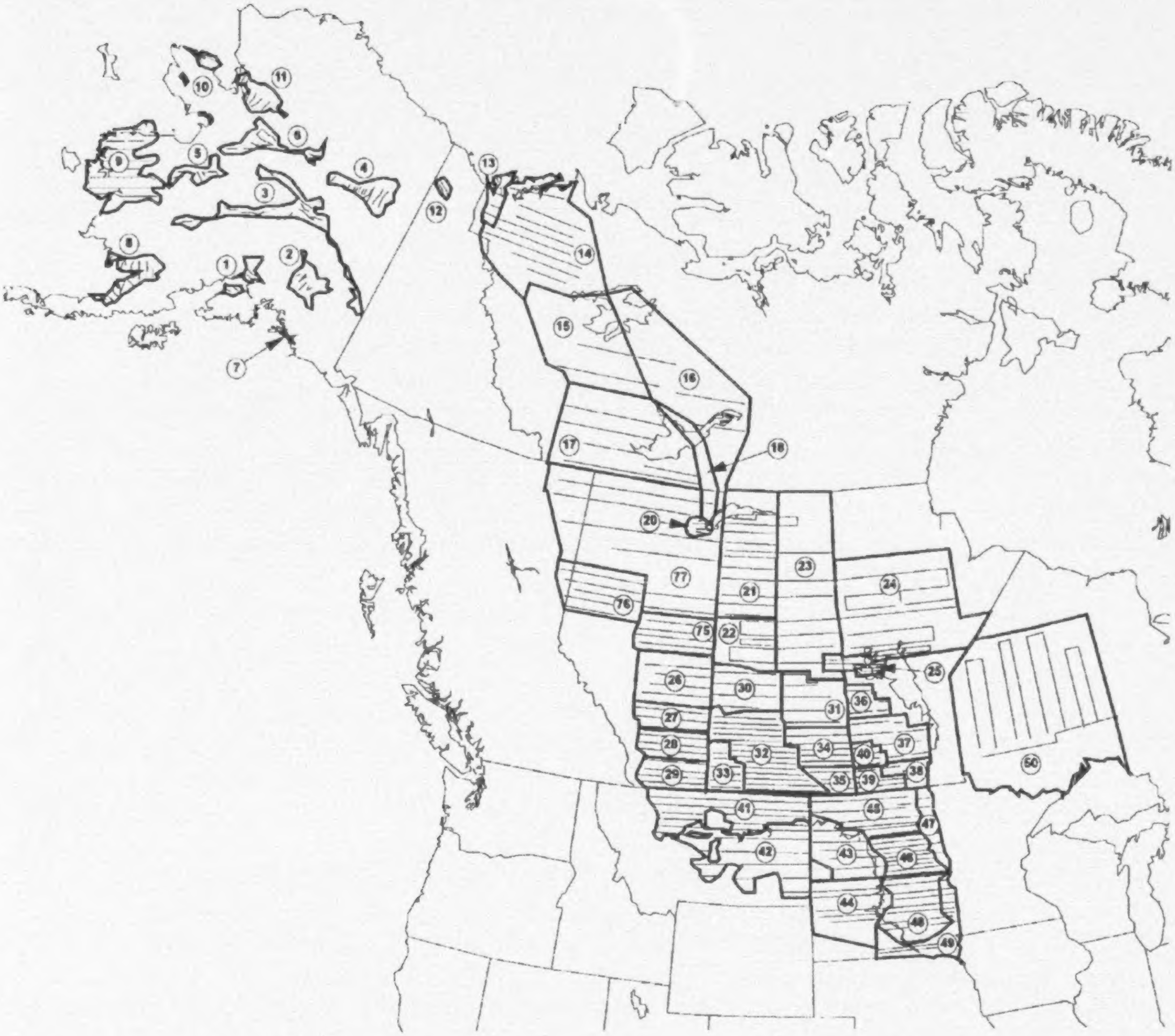
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Figure 6. Waterfowl Breeding Population and Habitat Survey of Western Canada: Traditional Survey Area of Western Canada and the United States
(Source: U.S. Department of the Interior and Environment Canada)

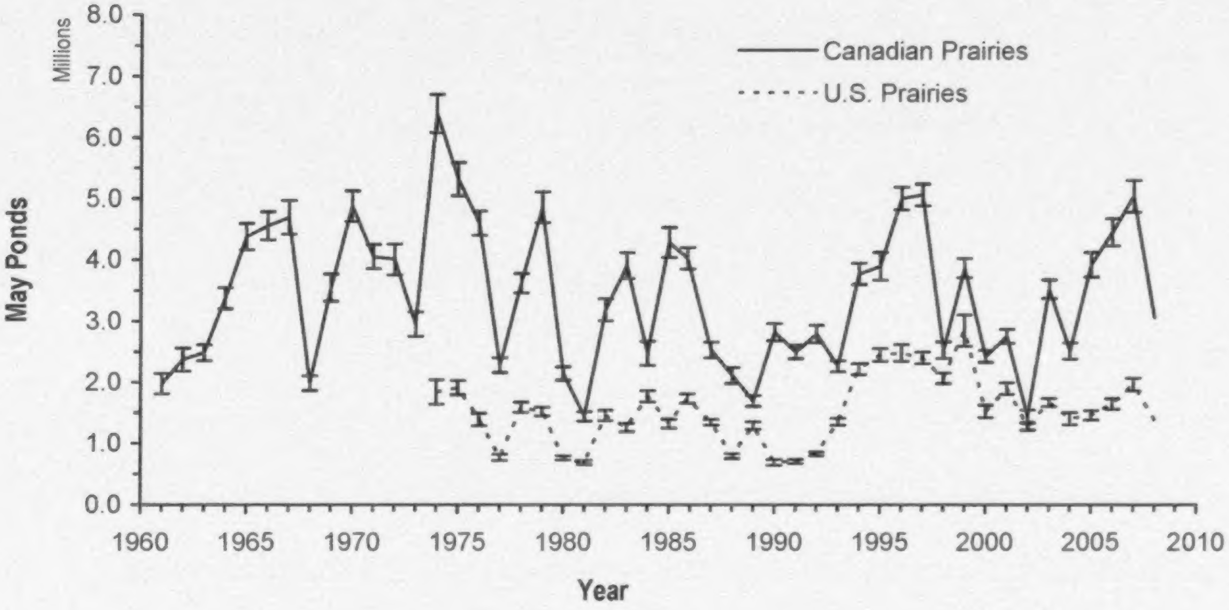


Figure 7. May Ponds in the Canadian and U.S. Prairies
Estimated number of ponds ± 1 SE.

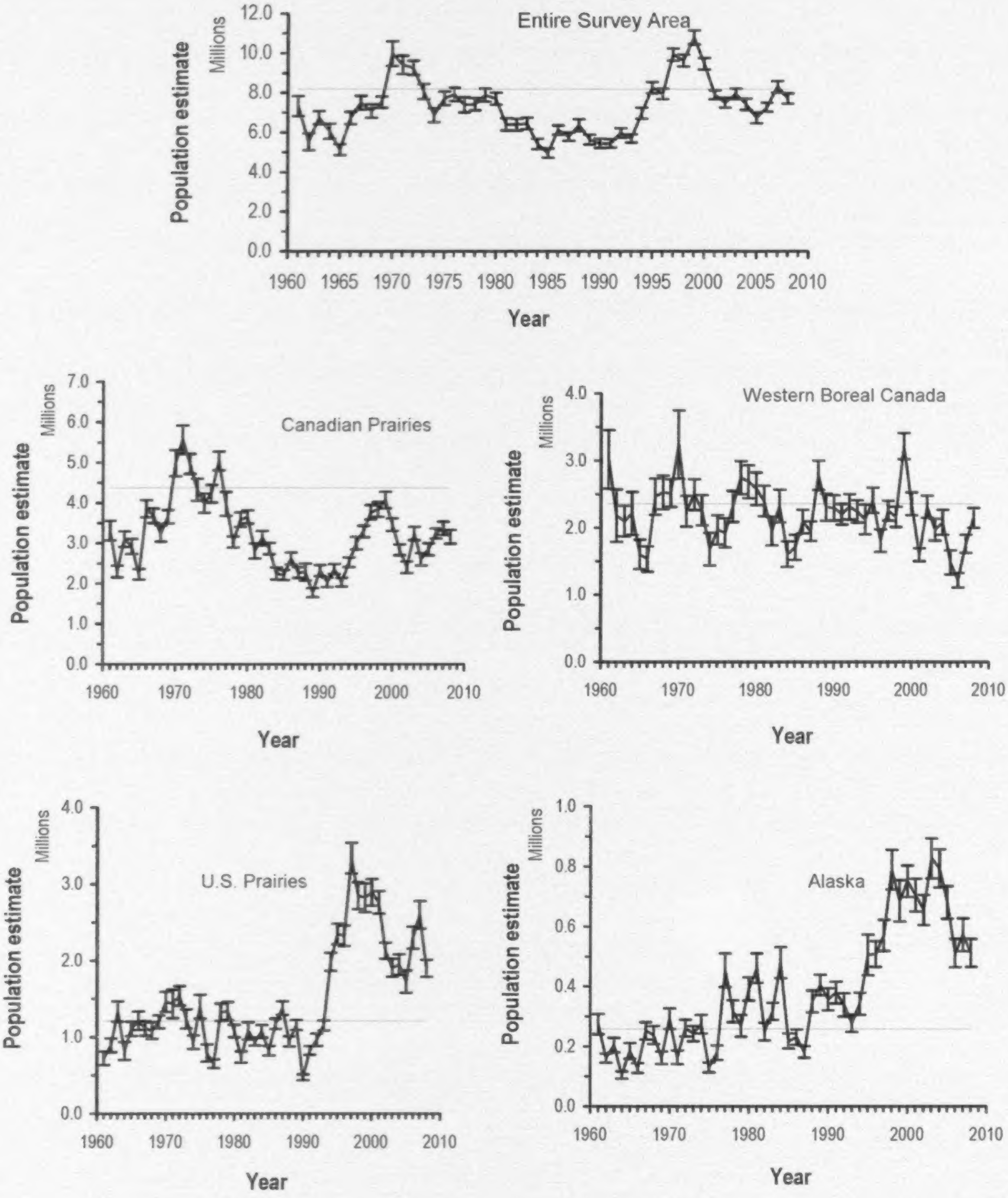


Figure 8. Mallard Breeding Population in the Traditional Survey Area of the Waterfowl breeding Population and Habitat Survey

Data shown are population estimates (±1 SE). The horizontal line represents the NAWMP population goal.

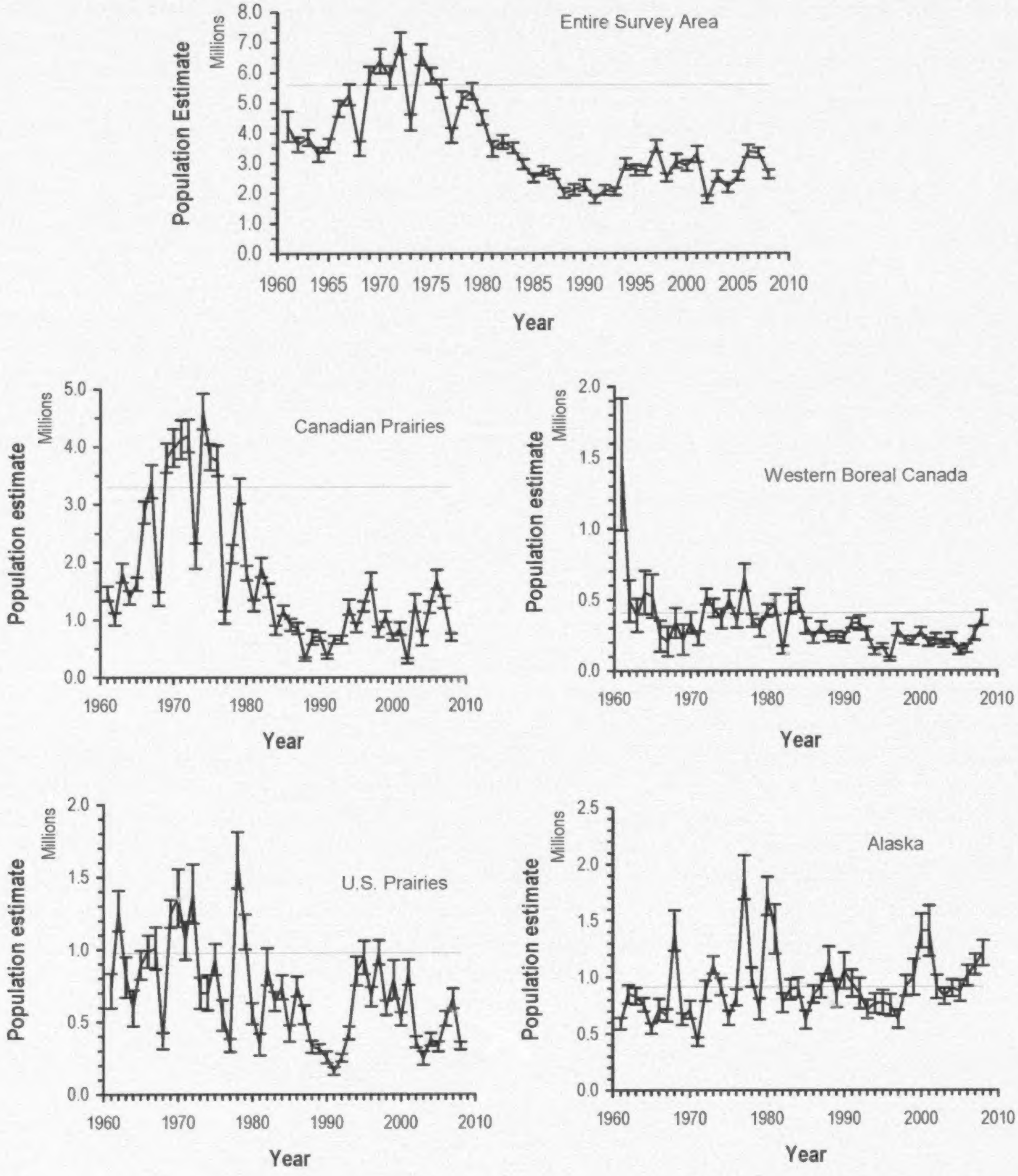


Figure 9. Northern Pintail Breeding Population in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are population estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

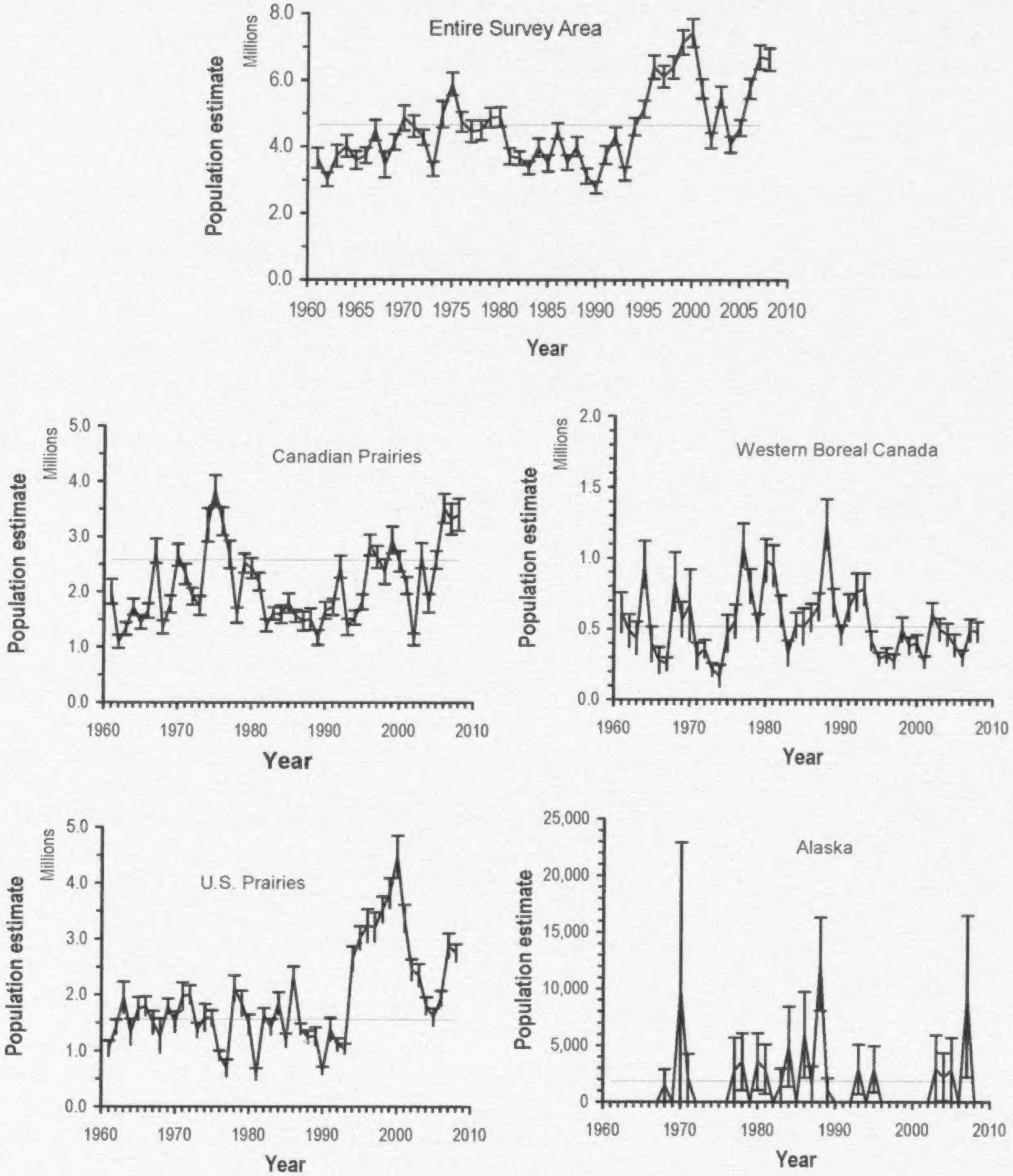


Figure 10. Blue-winged Teal Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are population estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

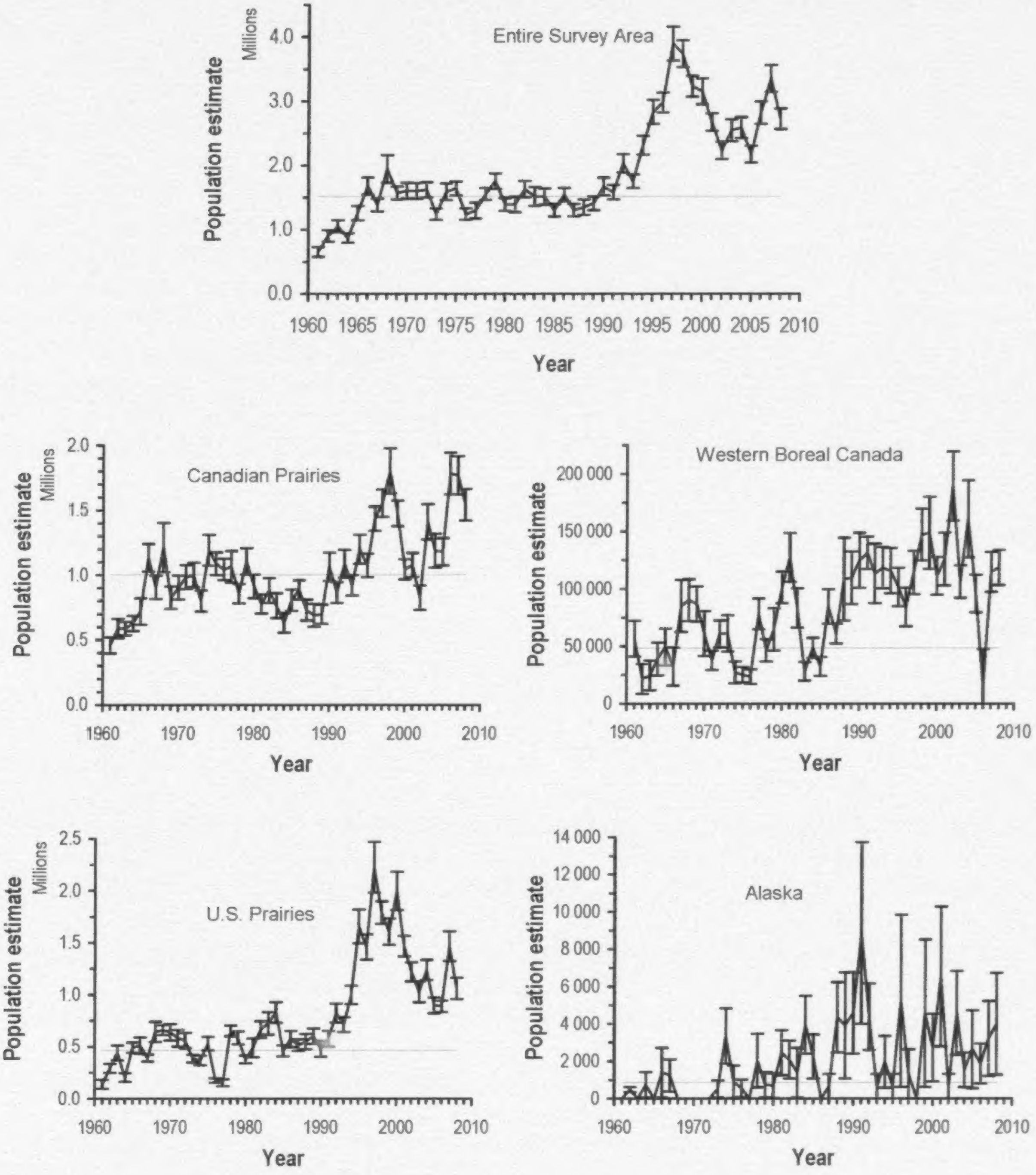


Figure 11. Gadwall Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

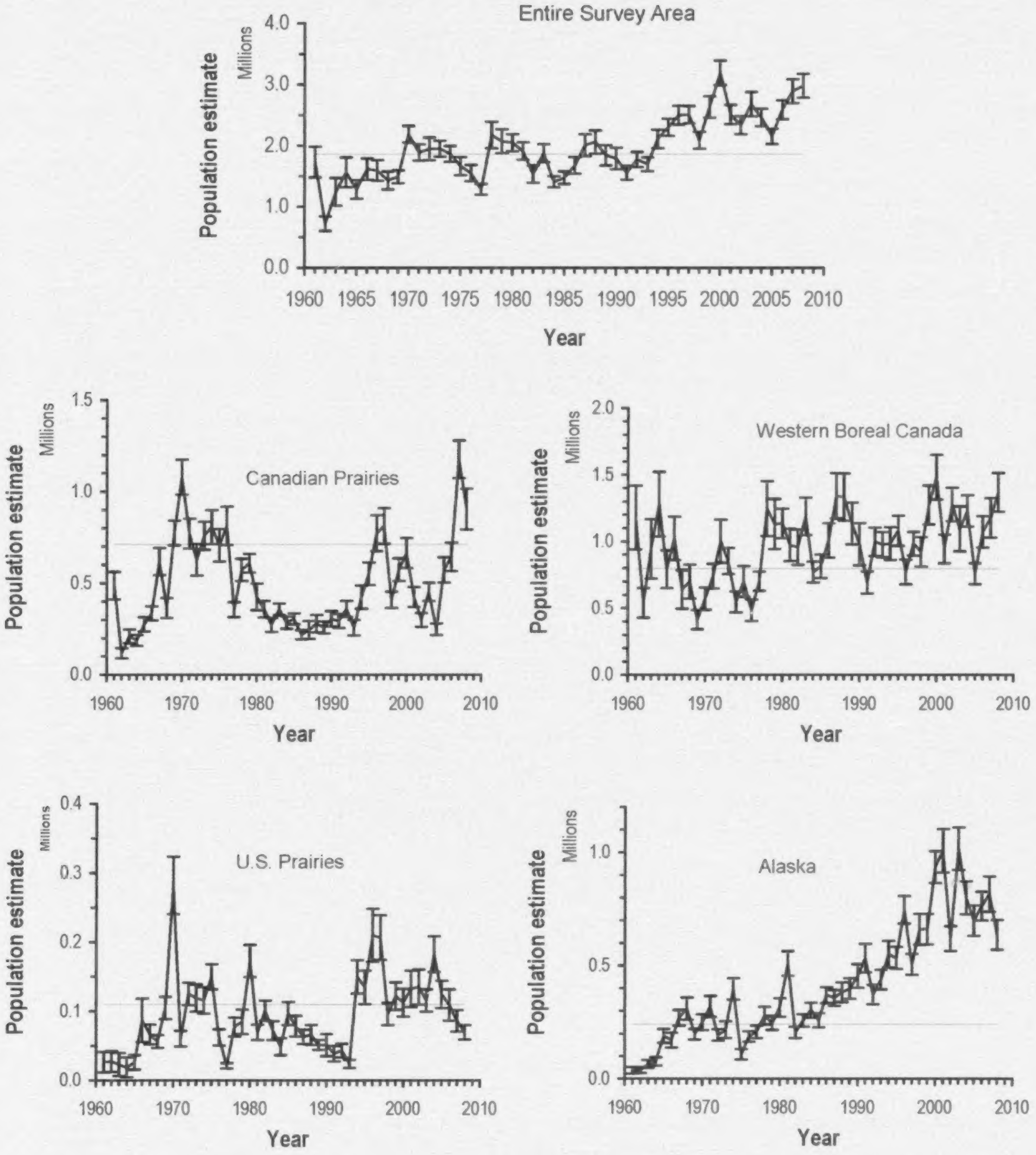


Figure 12. Green-winged Teal Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

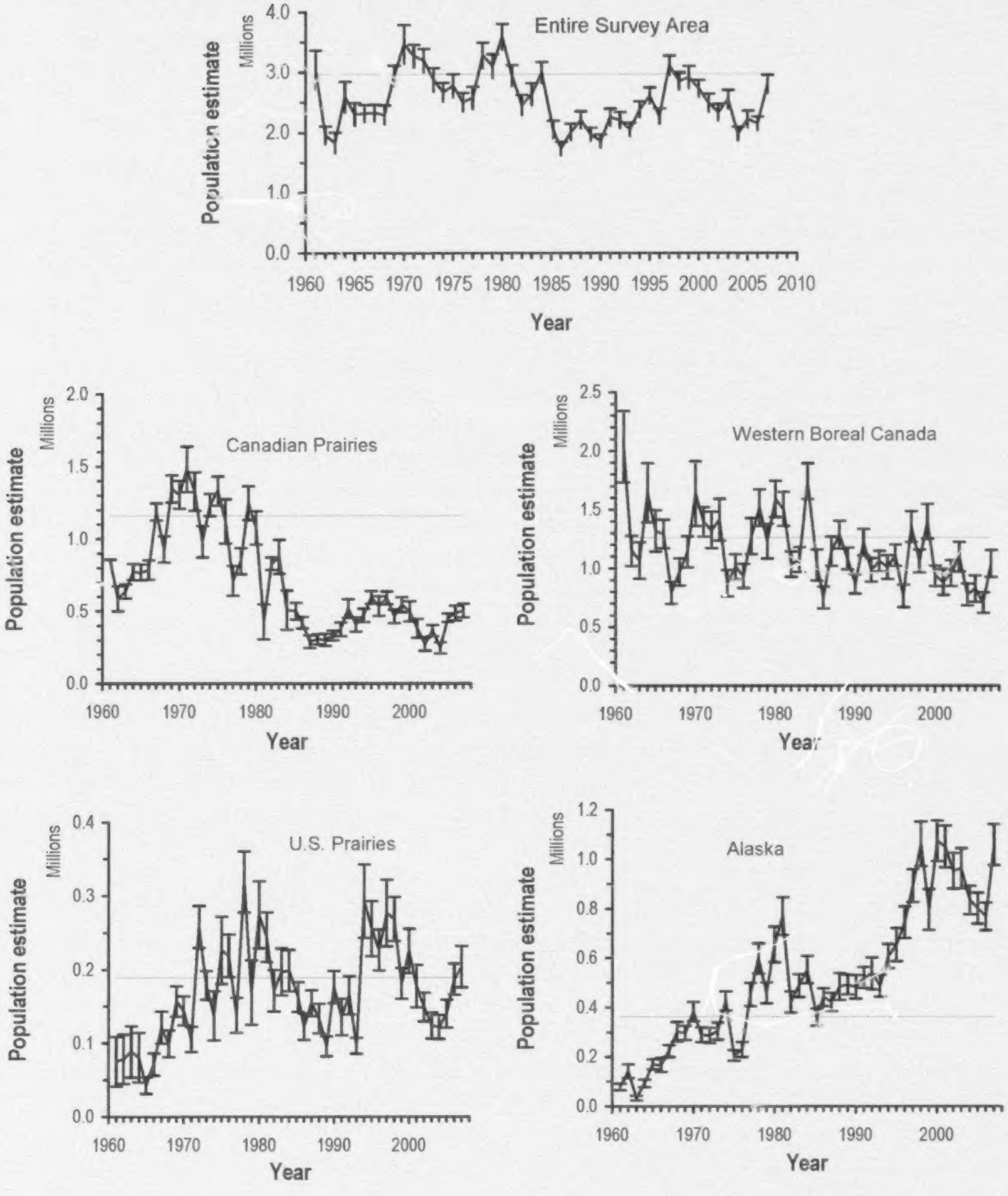


Figure 13. American Wigeon Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

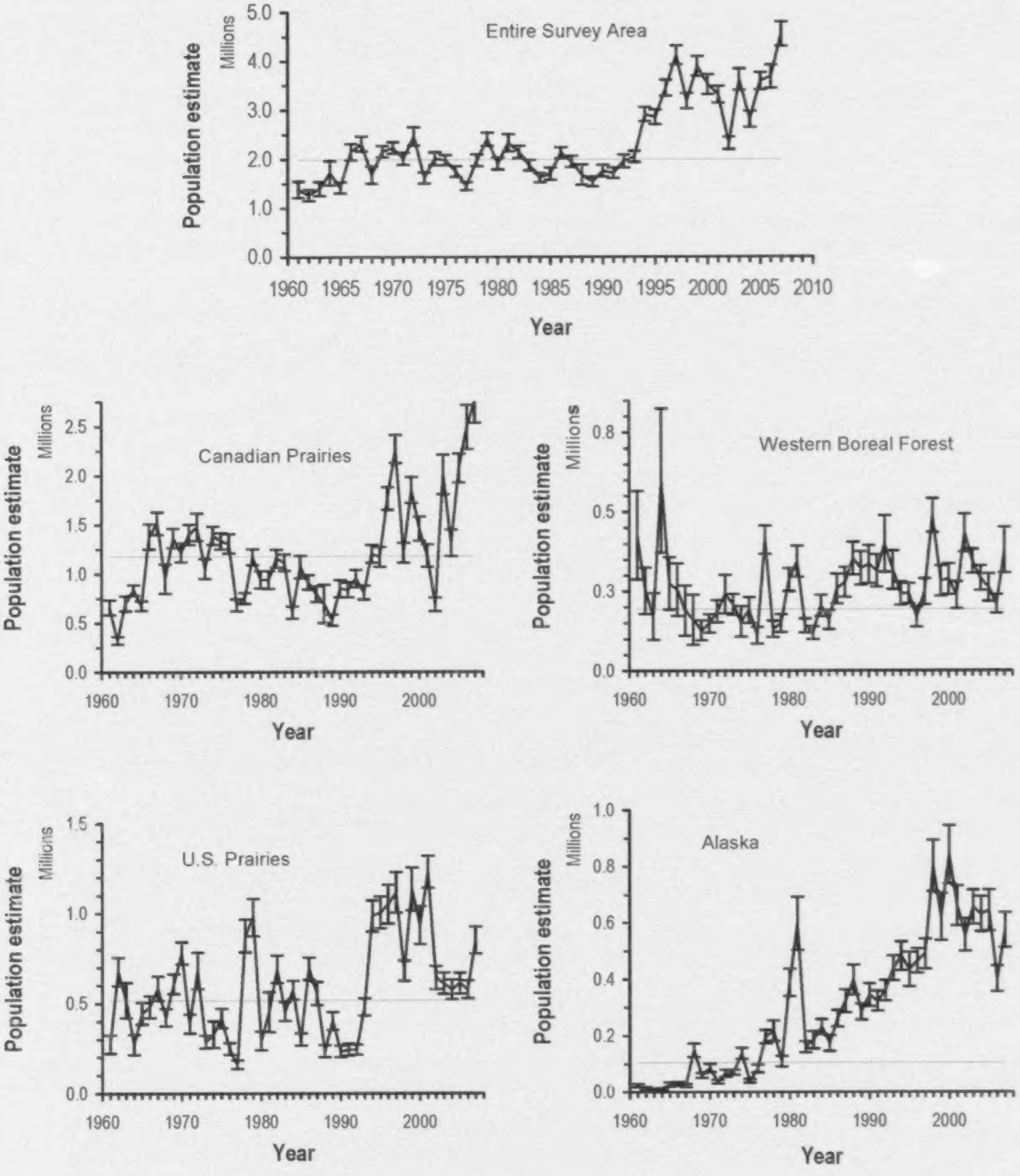
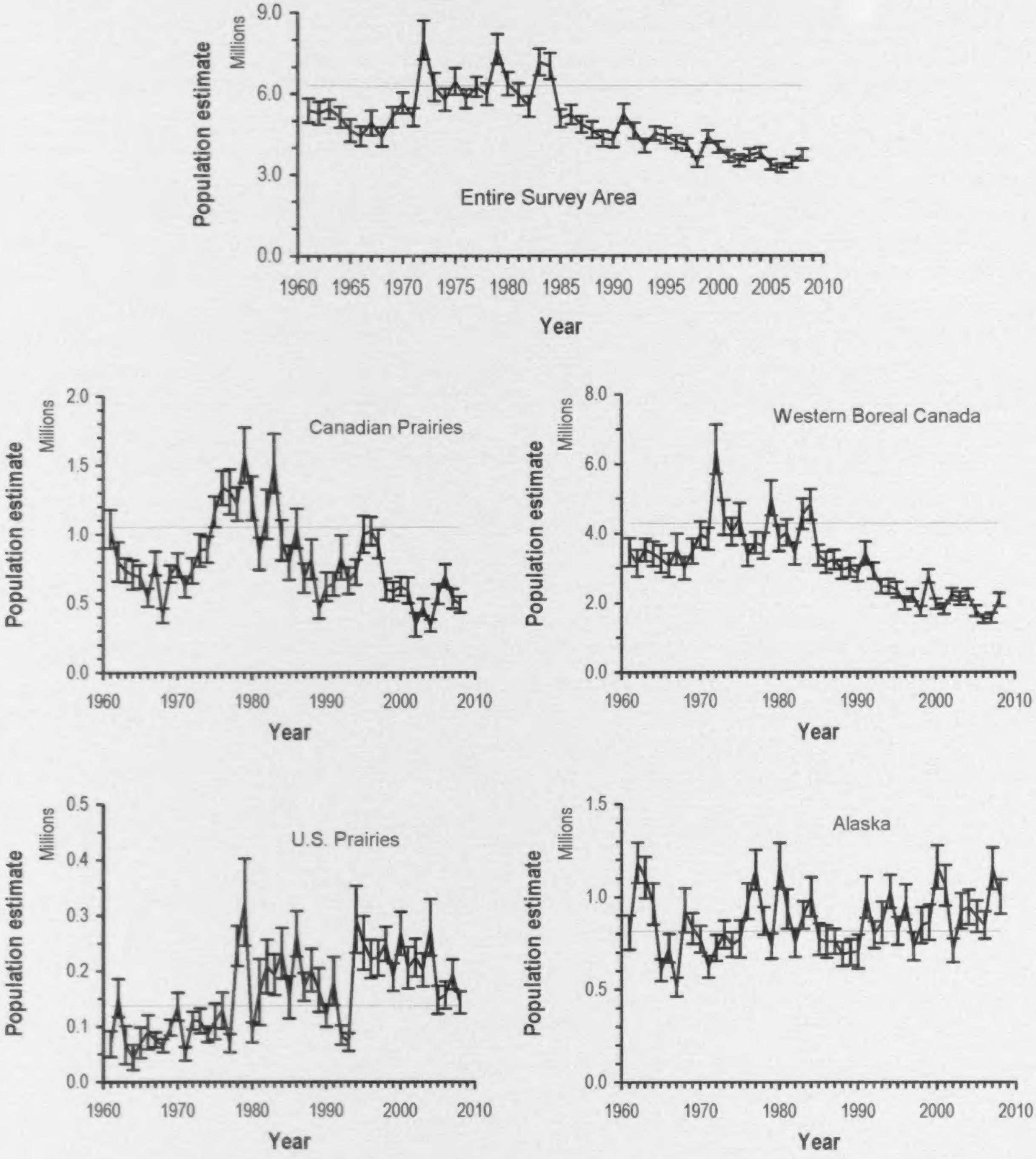


Figure 14. Northern Shoveler Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.


Entire Survey Area

Canadian Prairies

Western Boreal Canada

U.S. Prairies

Alaska

Figure 15. Scaup spp. Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey
Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

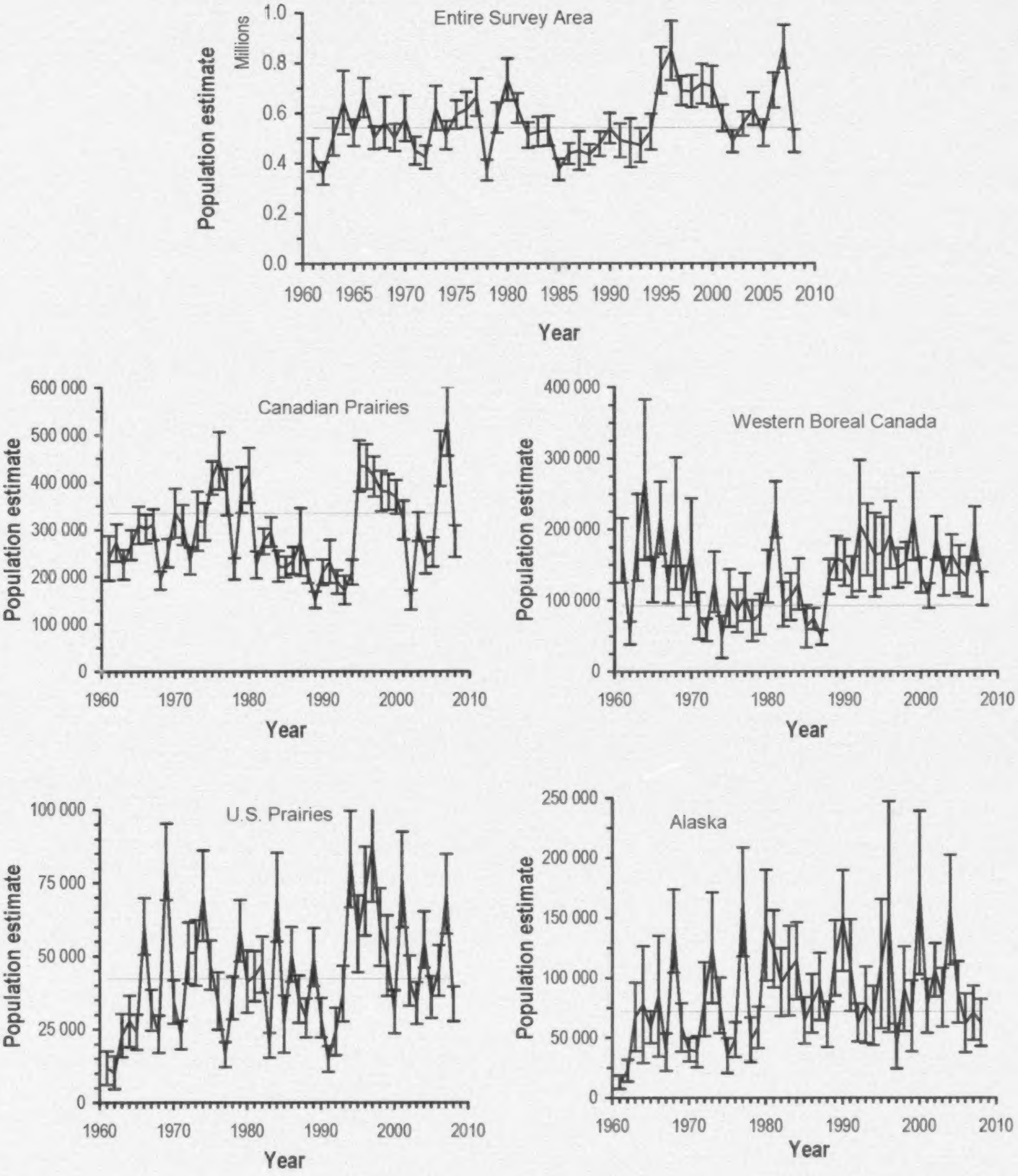


Figure 16. Canvasback Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

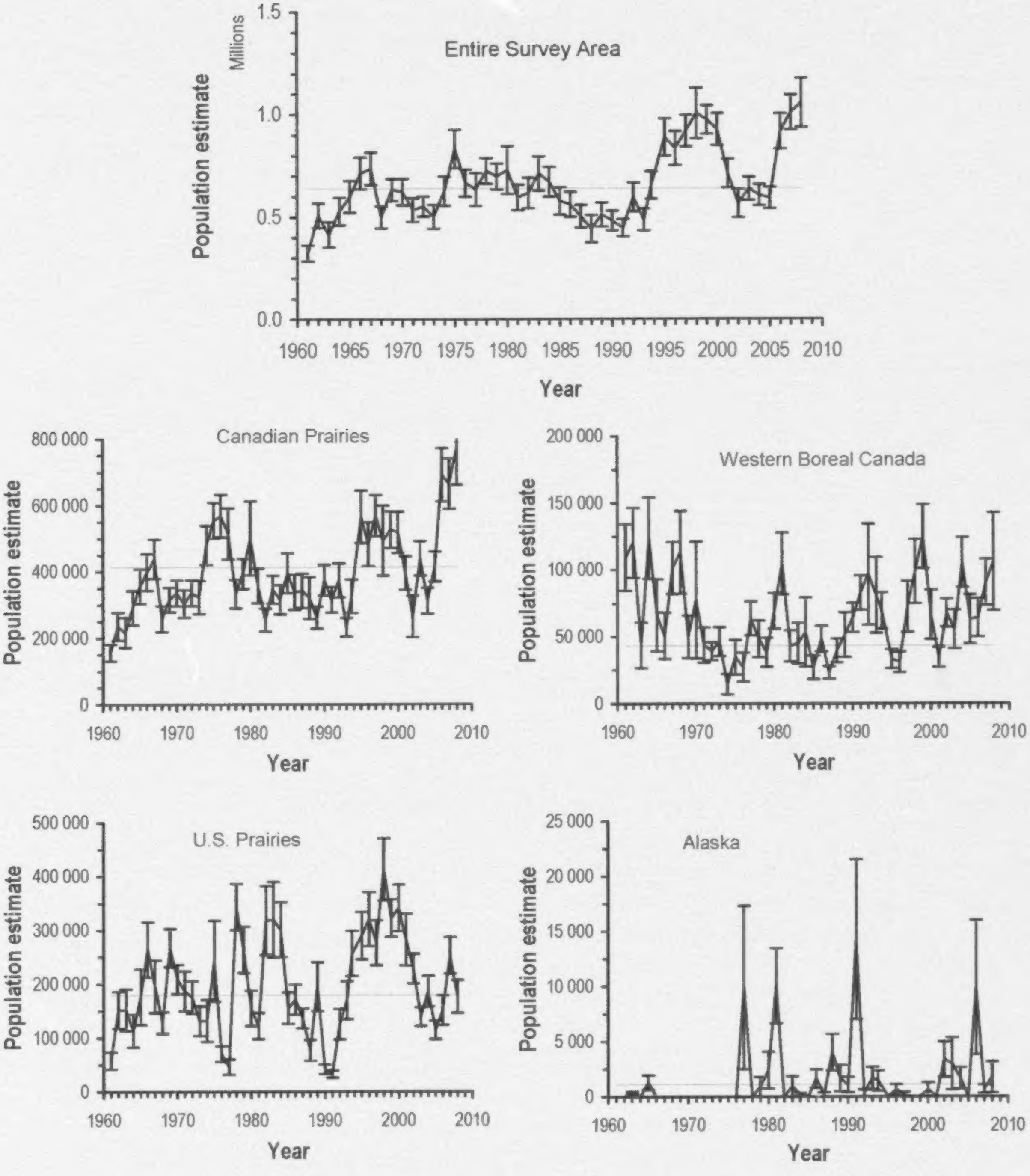


Figure 17. Redhead Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

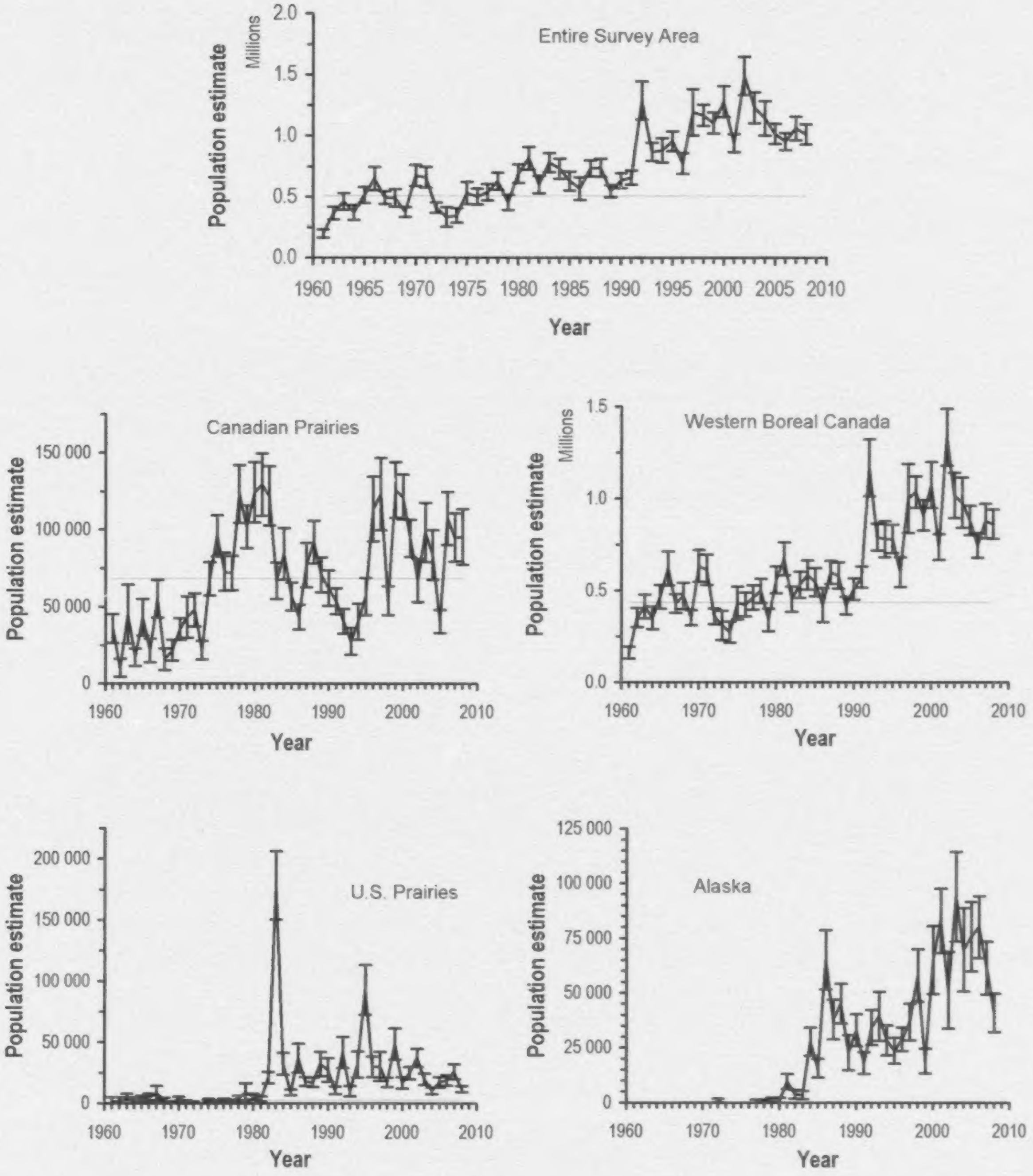


Figure 18. Ring-necked Duck Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

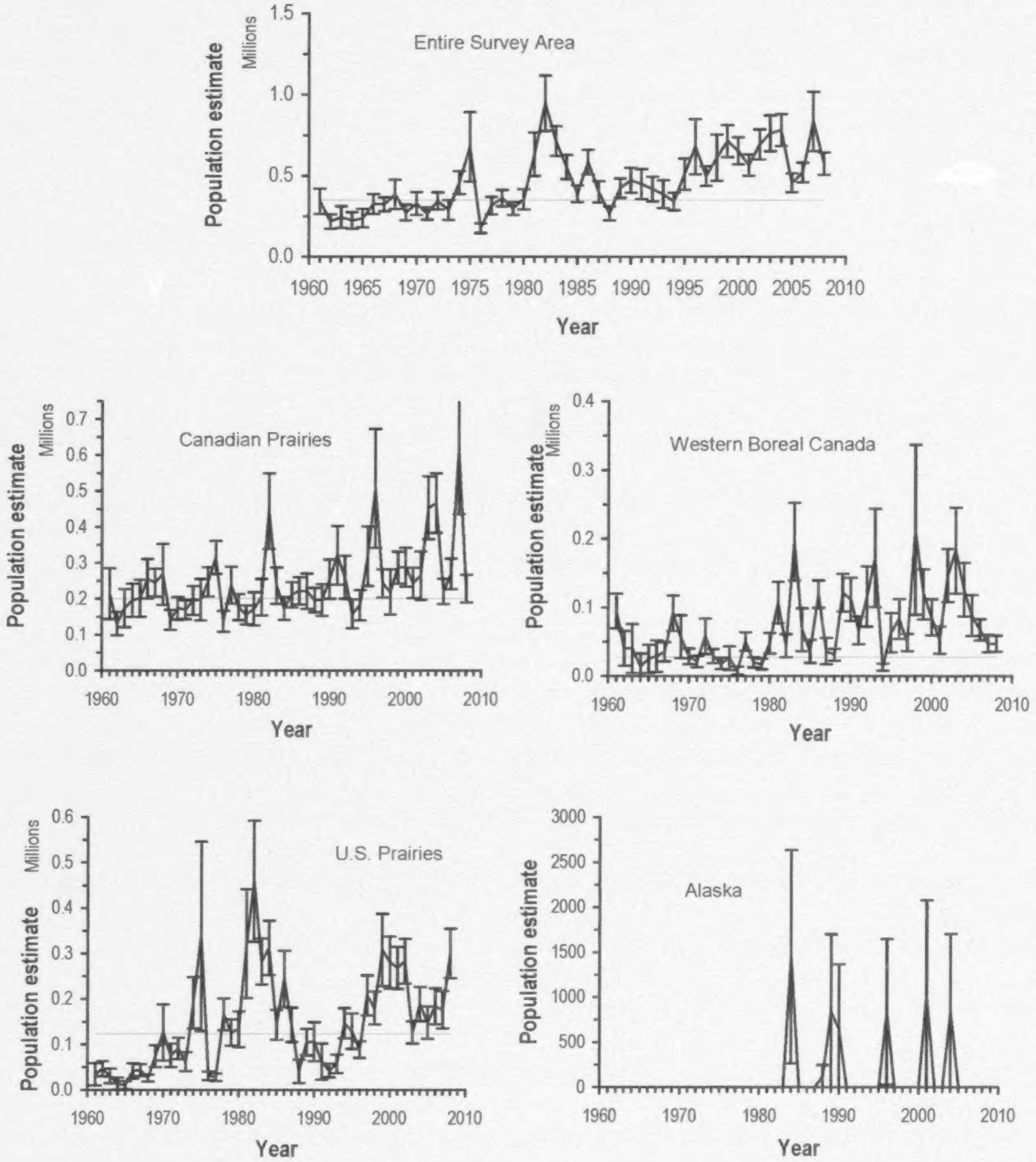


Figure 19. Ruddy Duck Breeding Populations in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey

Data shown are estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

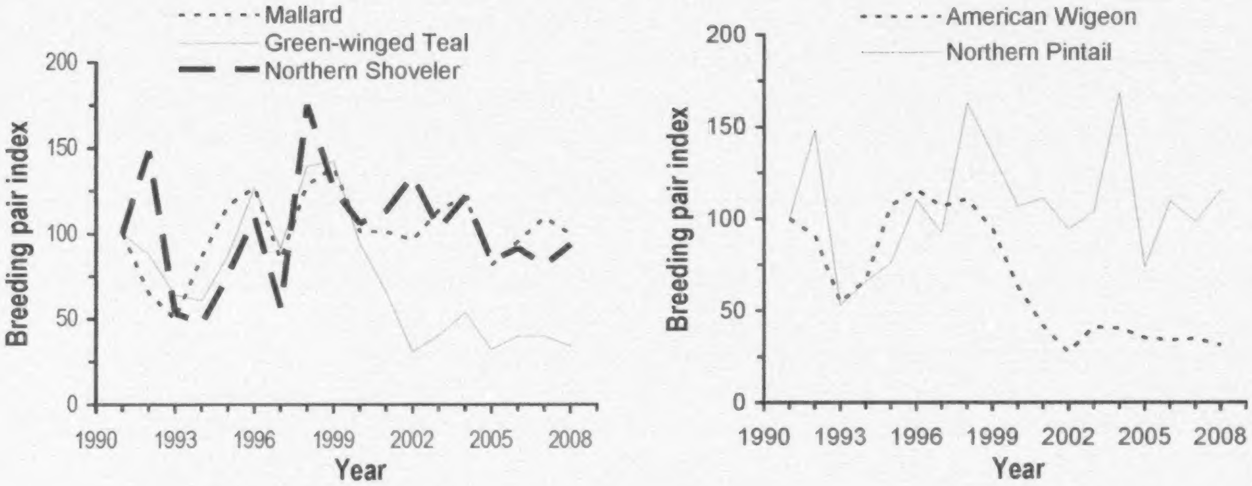


Figure 20. Common Dabbling Ducks in the Southern Yukon

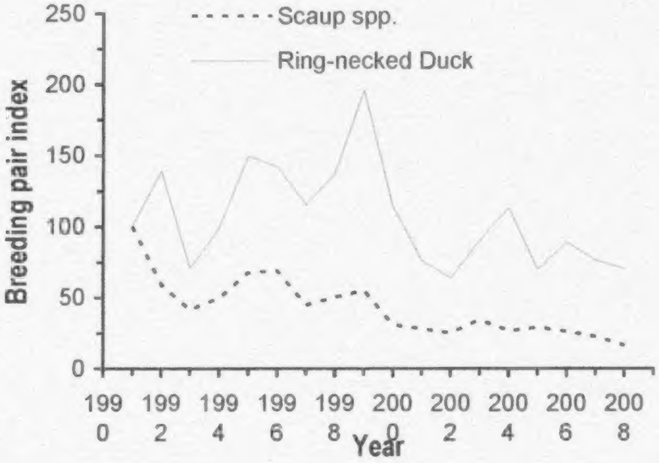


Figure 21. Common Diving Ducks in the Southern Yukon

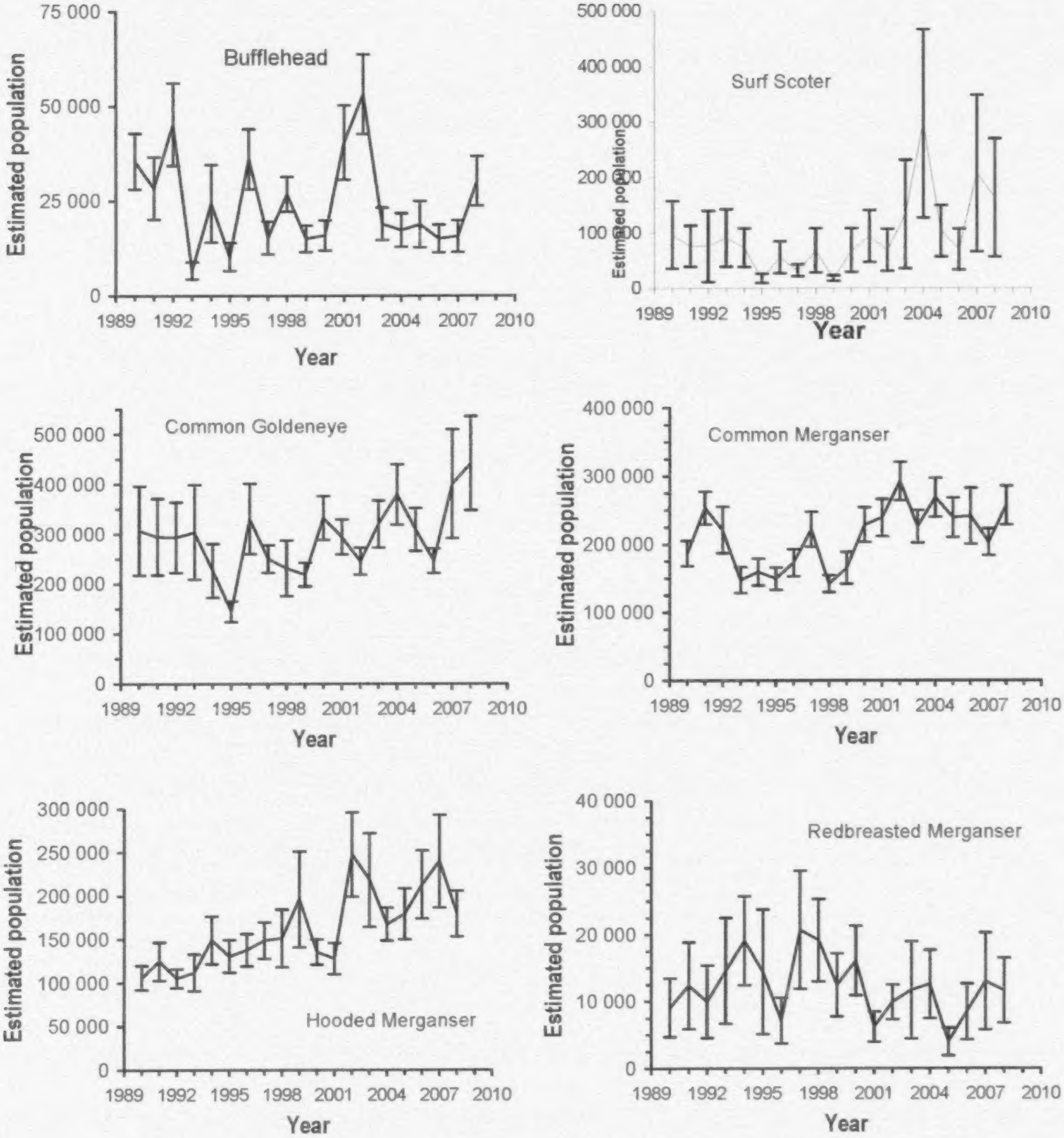


Figure 22. Bufflehead, Surf Scoter, Common Goldeneye, Common Merganser, Hooded Merganser and Redbreasted Merganser in the Eastern Waterfowl Survey area
The figures represent results from the helicopter surveys only (mean and SE).

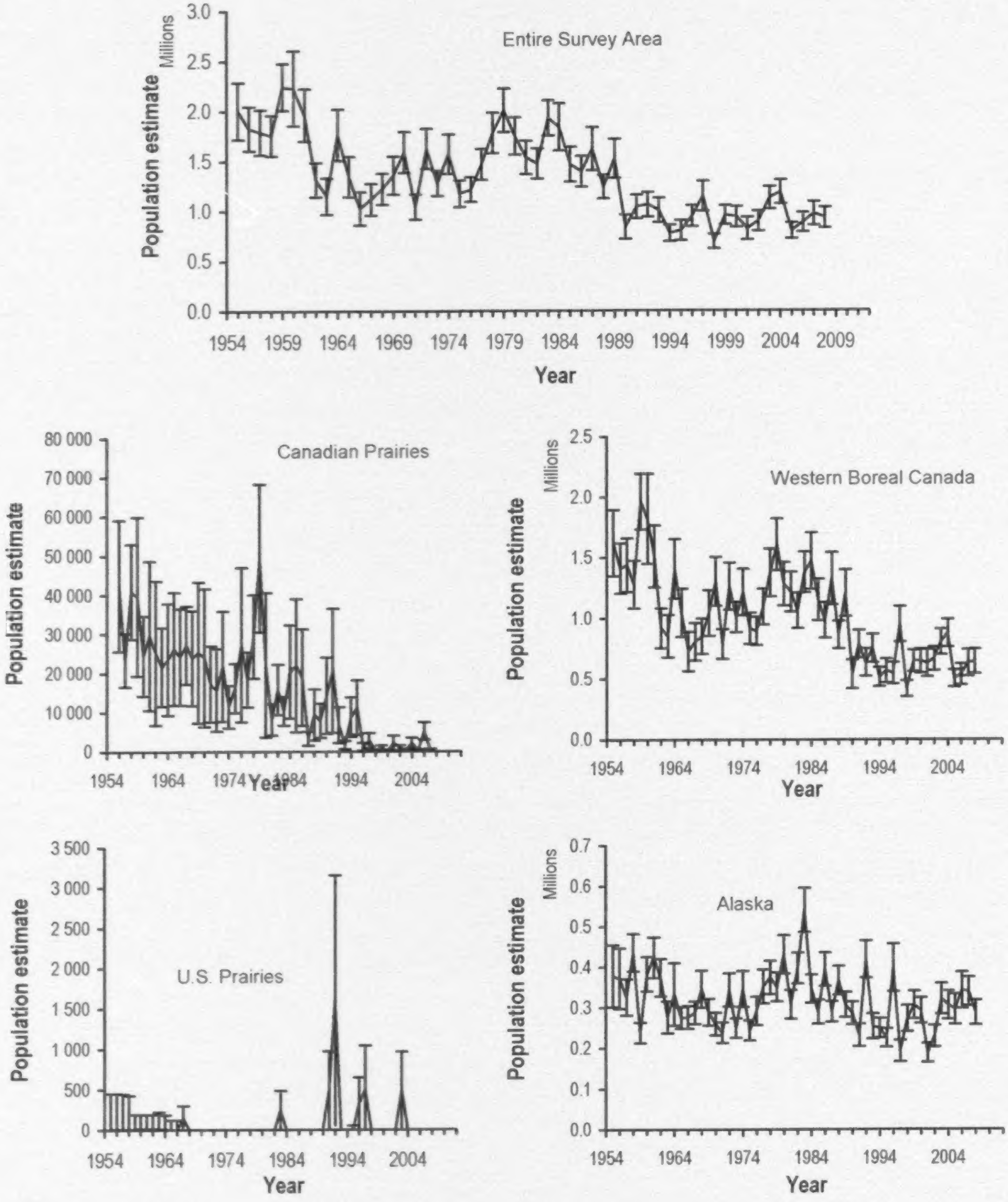


Figure 23. Scoter spp. Breeding Population Estimates in the Traditional Survey Area of the Waterfowl Breeding Population and Habitat Survey
Data shown are population estimates (± 1 SE). The horizontal line represents the NAWMP population goal.

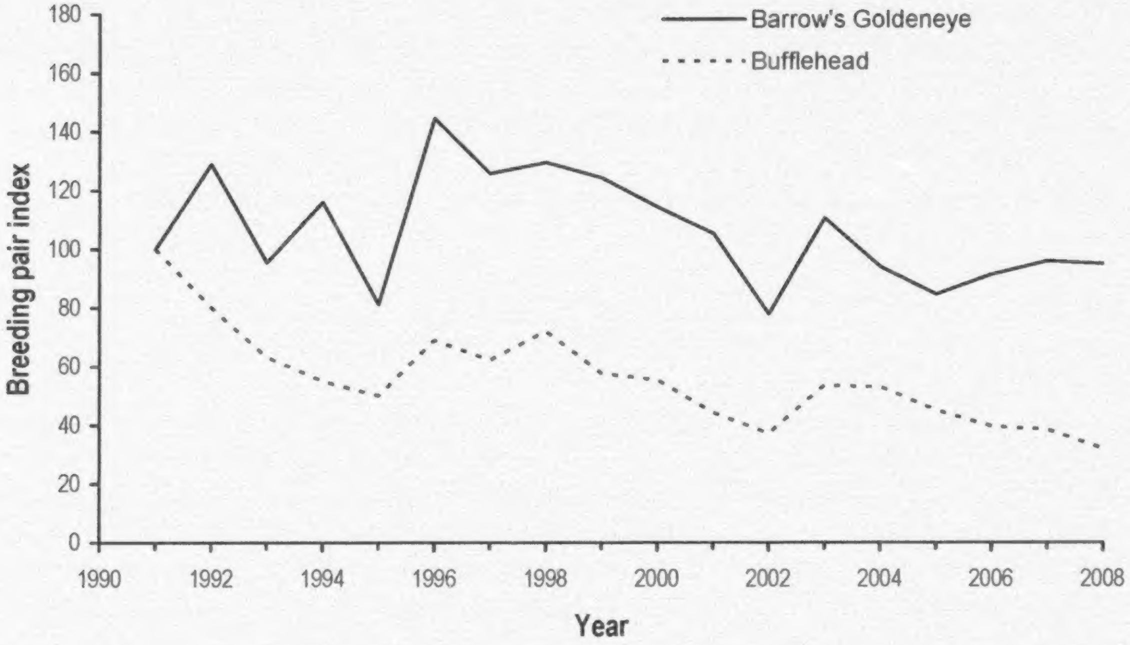


Figure 24. Common Sea Ducks of the Southern Yukon
Trends in indicated breeding pairs (Hughes,2008, pers. comm.)

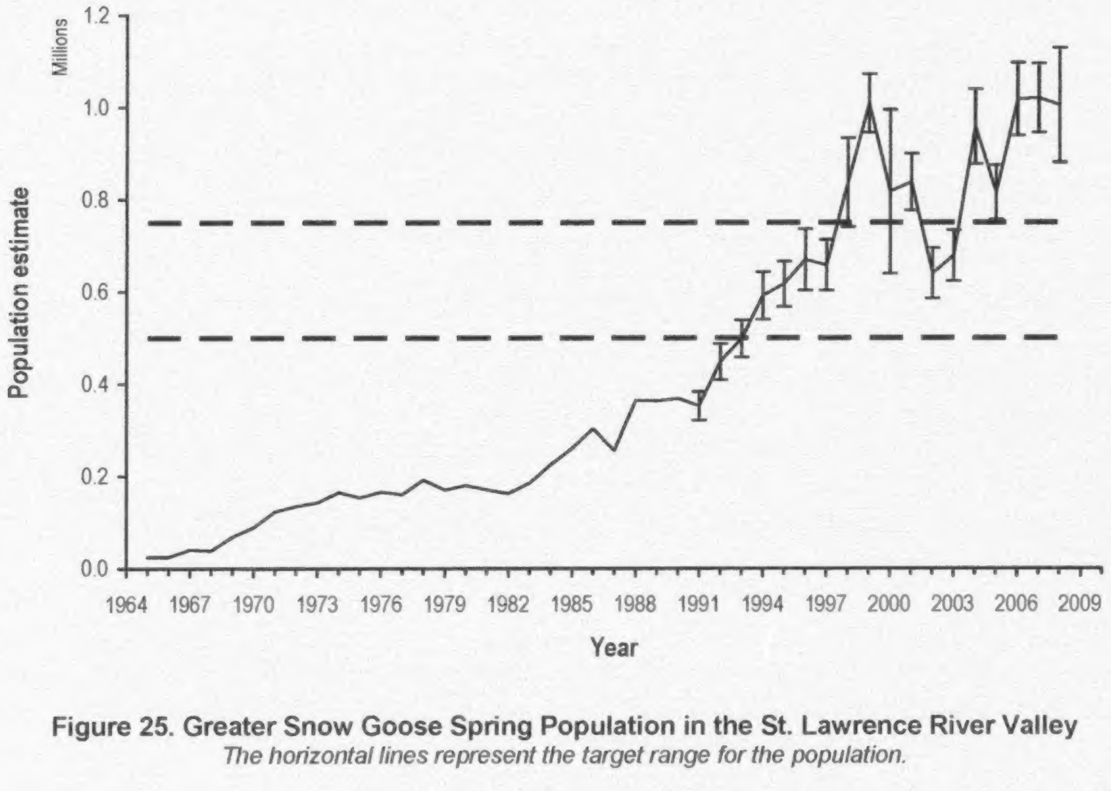


Figure 25. Greater Snow Goose Spring Population in the St. Lawrence River Valley
The horizontal lines represent the target range for the population.

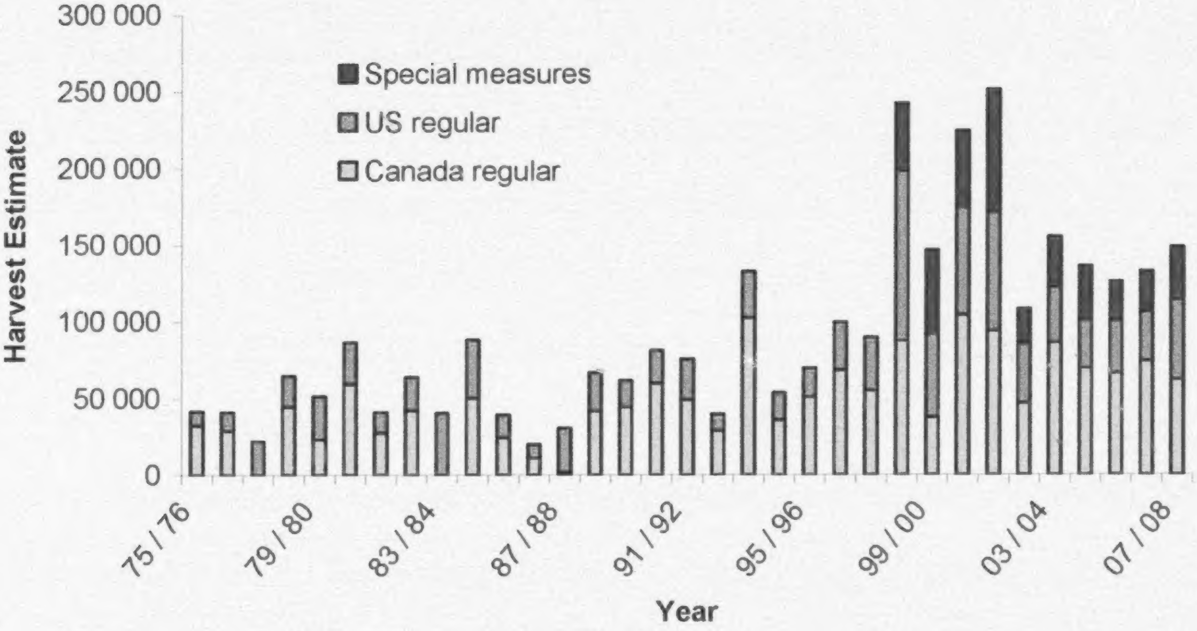


Figure 26. Harvest of Greater Snow Geese
Numbers include geese harvested during special conservation measures initiated in spring 1999.

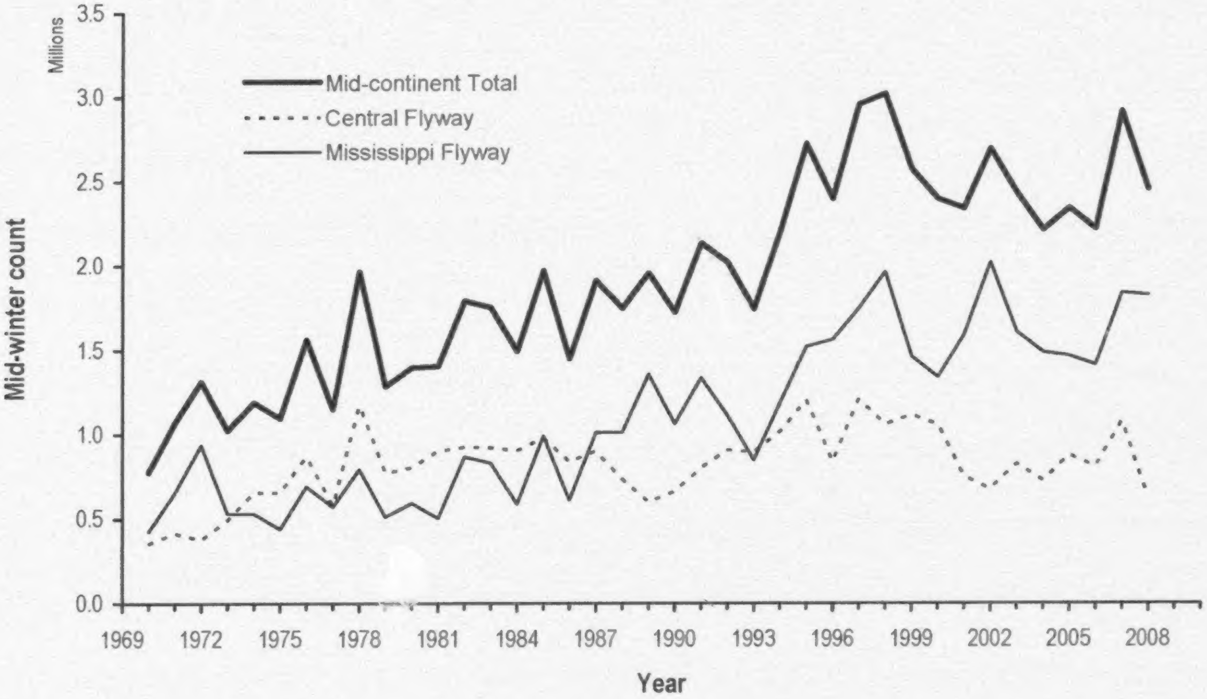


Figure 27. Mid-continent Lesser Snow Geese Populations in Mid-winter
Counts include some Ross' Geese. (Kruse, 2008b).

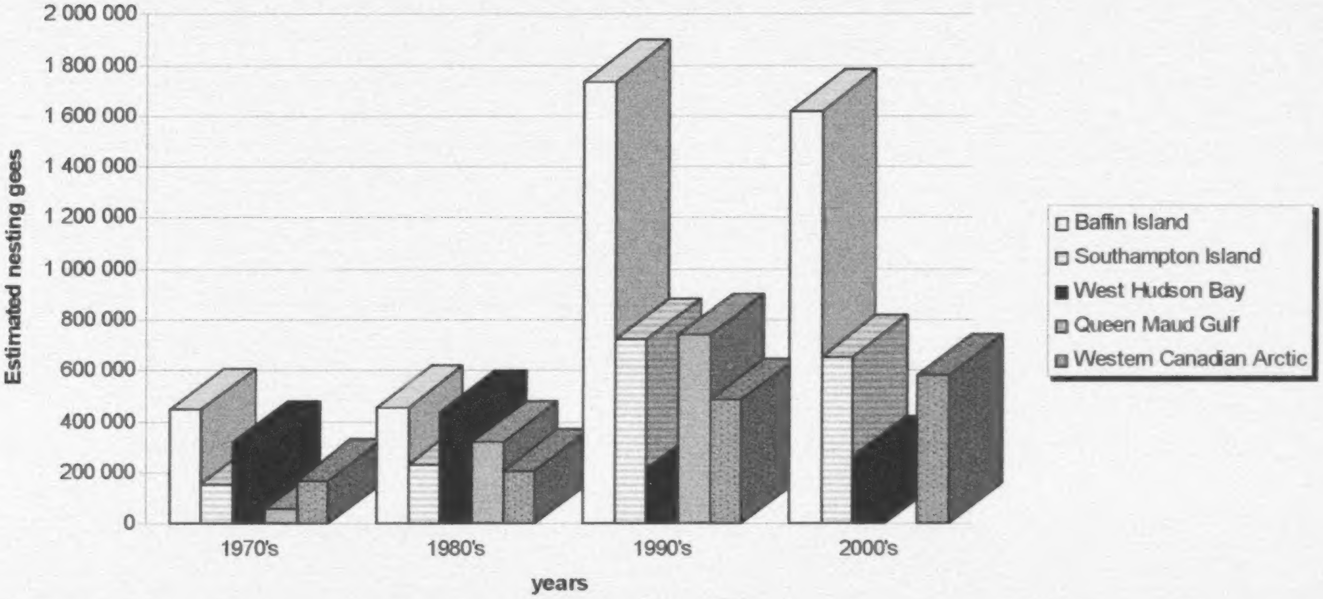


Figure 28. Number of Nesting Lesser Snow Geese Estimated through Photo-inventories of Major Breeding Colonies in Canada

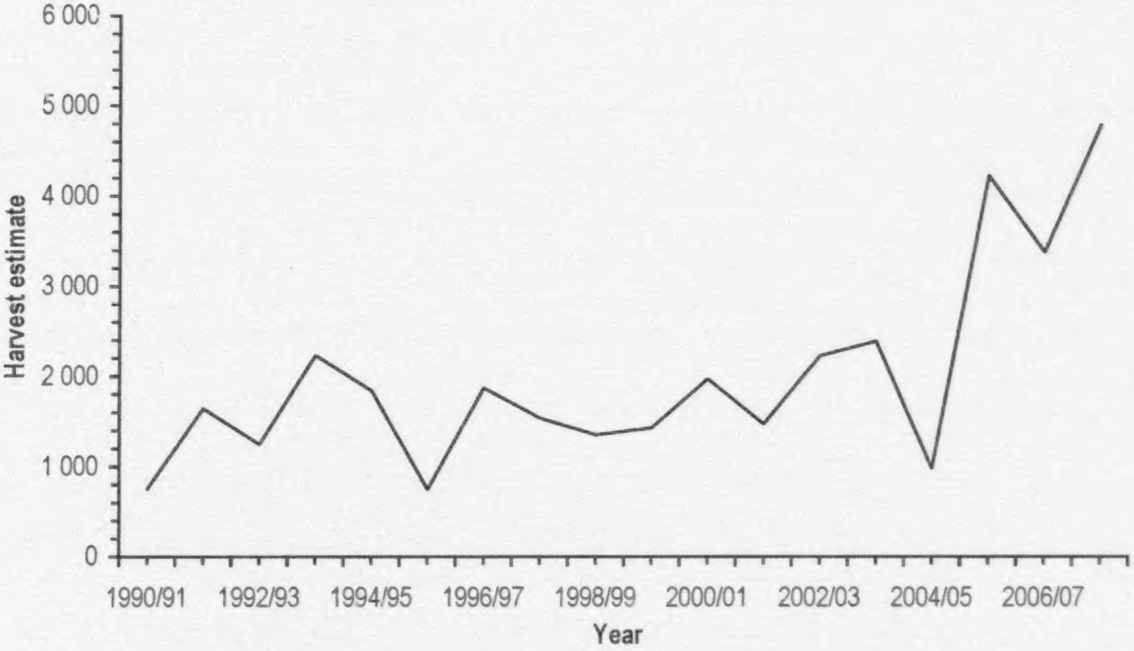


Figure 29. Lesser Snow Geese Harvest Estimates for the Wrangel Island Population
Estimates include adjustment for cripple loss (A. Breault, CWS, unpublished).

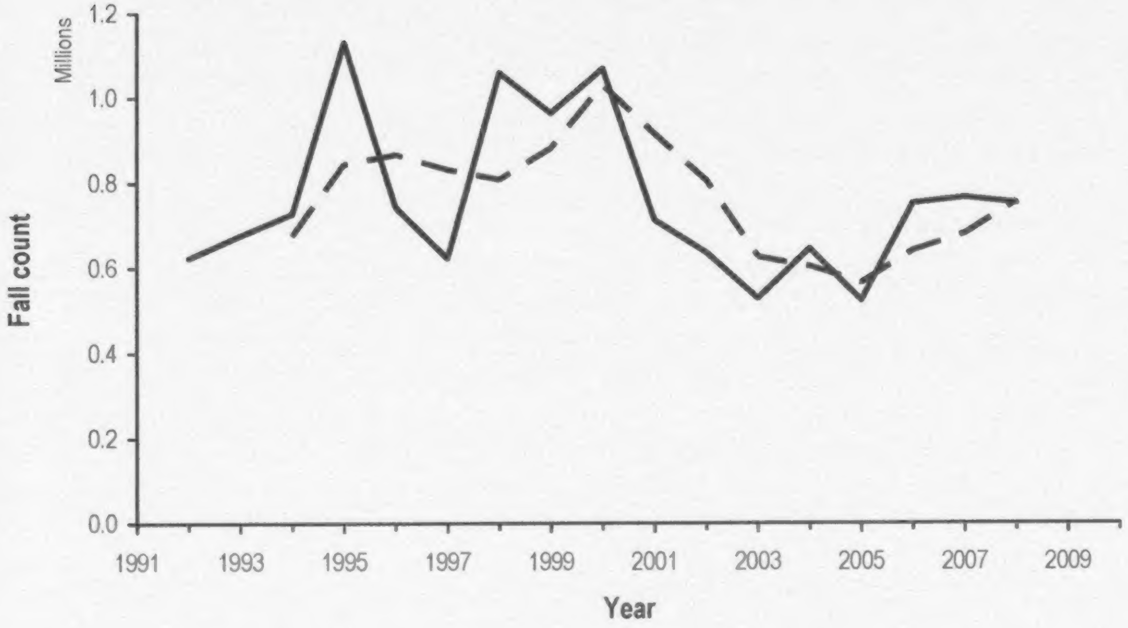
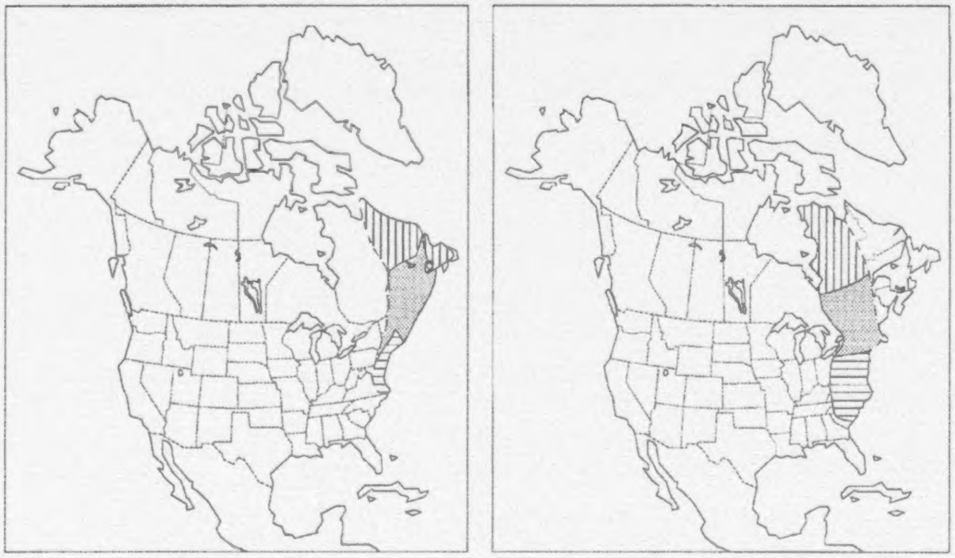


Figure 30. Greater White-fronted Geese of the Mid-Continent

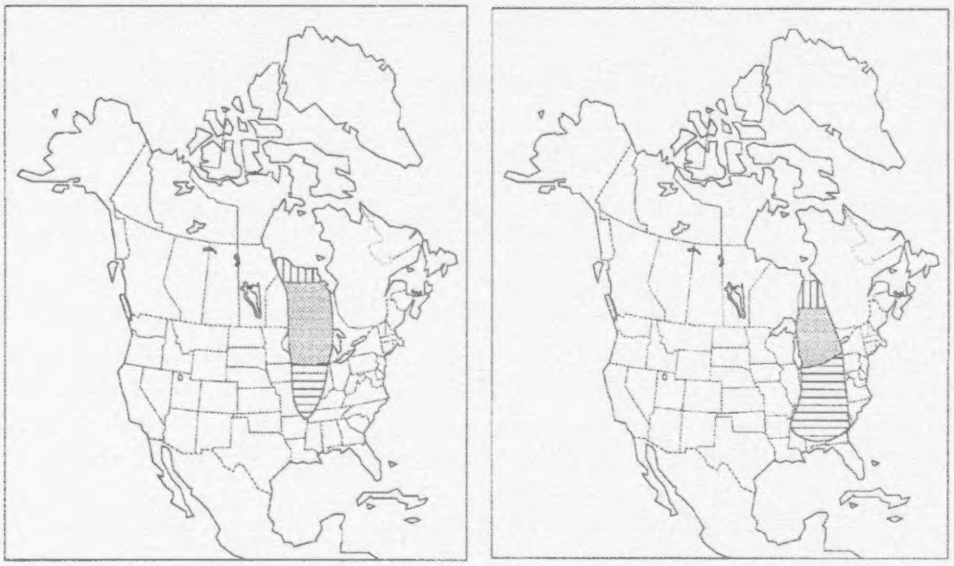
Fall survey on staging areas in Saskatchewan and Alberta (Nieman et al., in prep.).

The solid line represents actual counts, and the dashed line represents the running three-year mean.



North Atlantic

Atlantic



Mississippi Valley

Southern James Bay

Legend

▥ Breeding ▒ Occurs in migration ☰ Wintering ▩ Breeding & wintering ▨ Resident

(from Bellrose 1976, Palmer 1976, Rusch et al. 1996, USFWS 1996)

Figure 31a. Canada Goose Populations in North America: NAP, AP, MVP and SJBP.

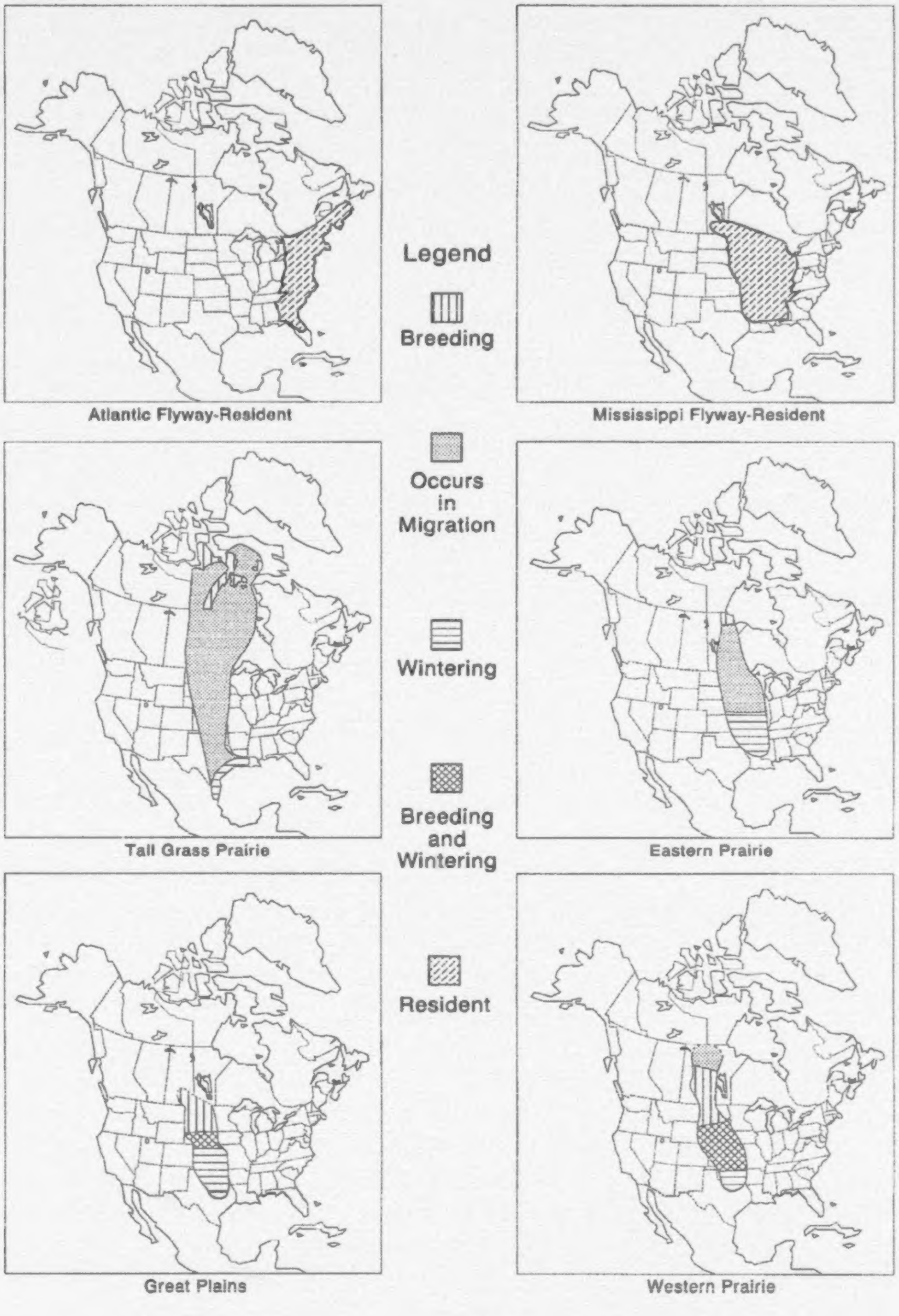

Atlantic Flyway-Resident
Mississippi Flyway-Resident
Legend
Breeding
Occurs in Migration
Wintering
Breeding and Wintering
Resident
Tall Grass Prairie
Eastern Prairie
Great Plains
Western Prairie

Figure 31b. Canada Goose Populations in North America: AFRP, MFRP, EPP, GPP and WPP. Cackling Goose Population: TGPP

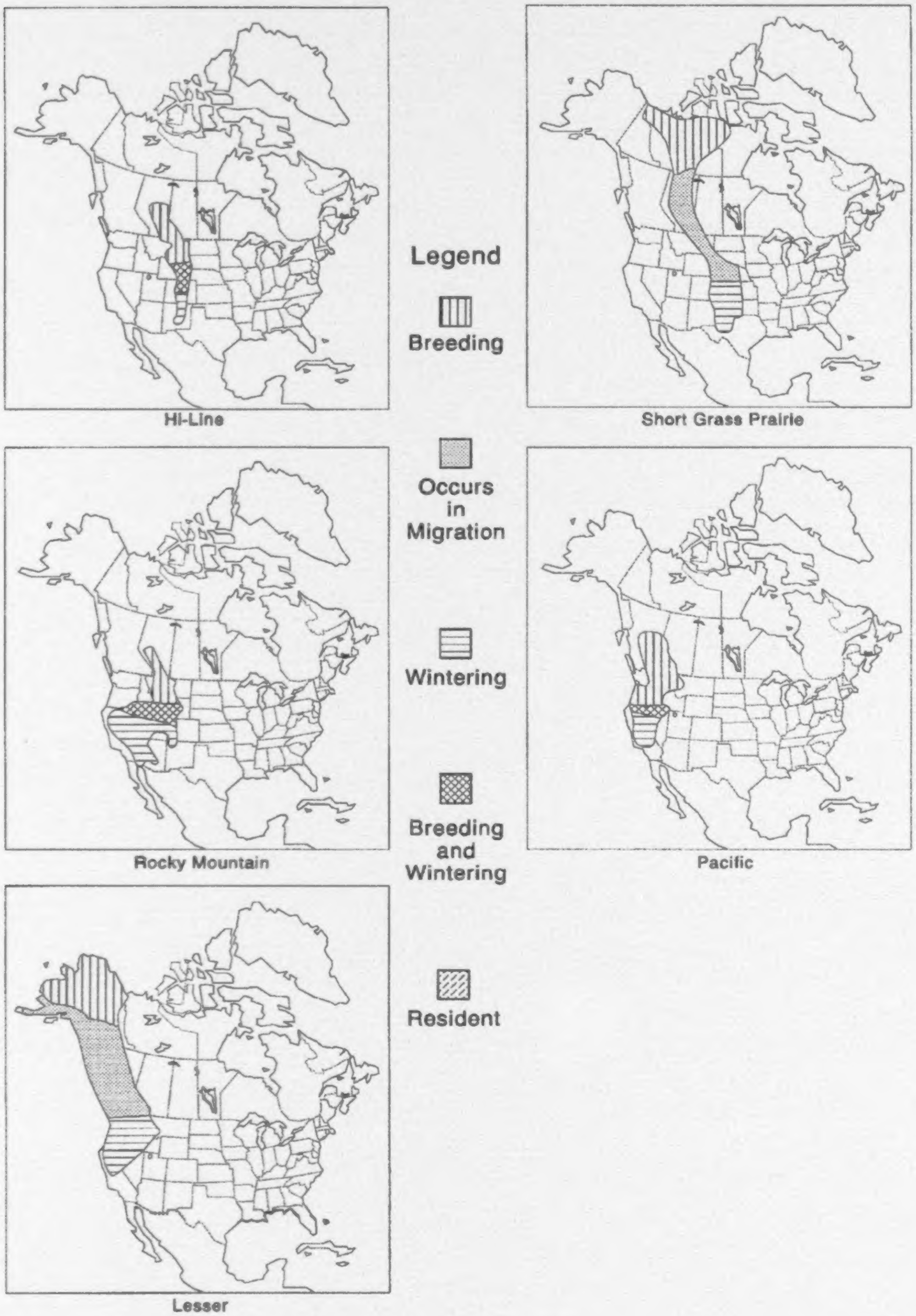

Hi-Line
Short Grass Prairie
Legend
Breeding
Occurs in Migration
Wintering
Breeding and Wintering
Resident
Rocky Mountain
Pacific
Lesser

Figure 31c. Canada Goose Populations in North America: HLP, RMP, PP and LP.
Mixed Cackling / Canada Goose Population: SGPP

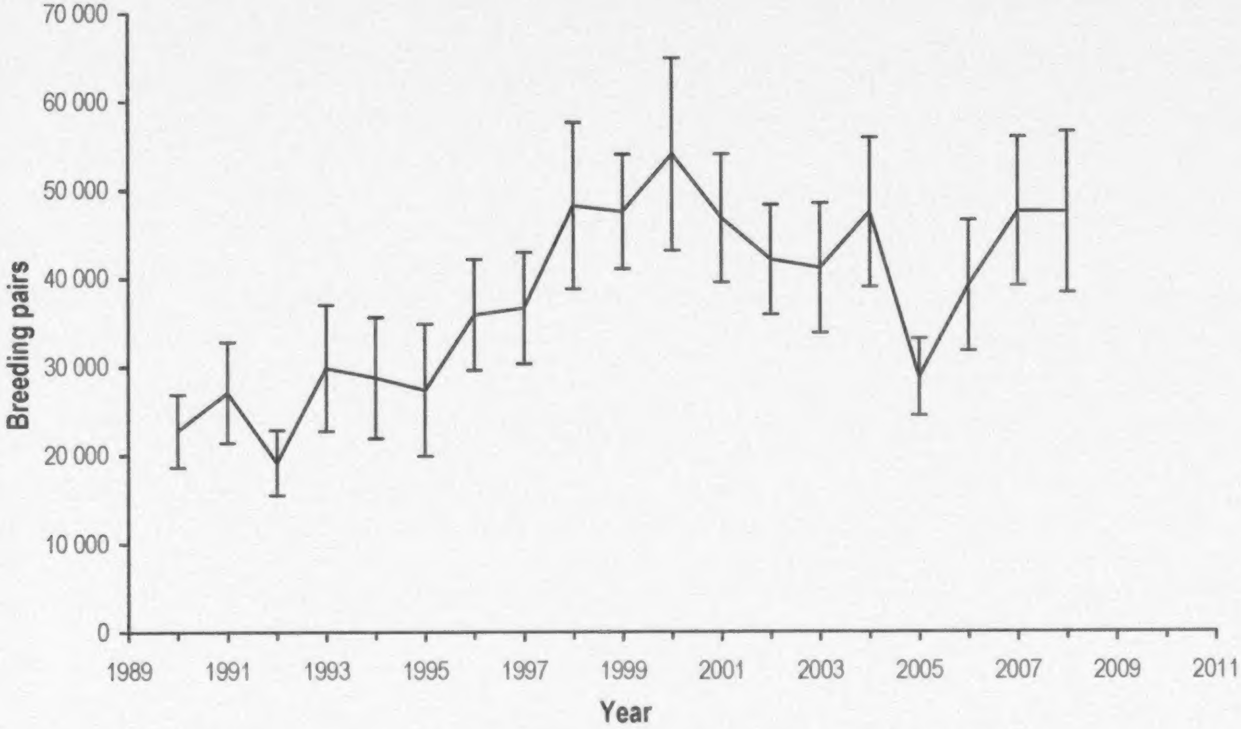


Figure 32. Breeding Pairs of the North Atlantic Population Canada Geese in Stratum 2 of the Eastern Waterfowl Survey Area (see Figure 1)

Breeding pairs (±1 ET).

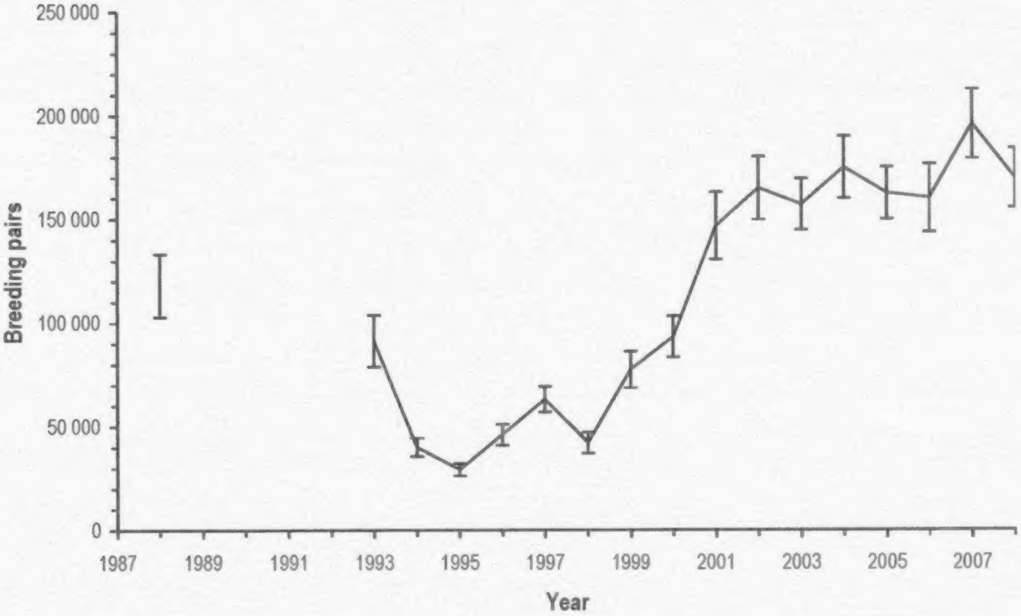


Figure 33. Breeding Pairs of the Atlantic Population Canada Geese in the Ungava Peninsula of northern Quebec

Breeding pairs ± 1SE. No surveys were conducted from 1989-1992. (Source: Harvey and Rodrigue, 2008)

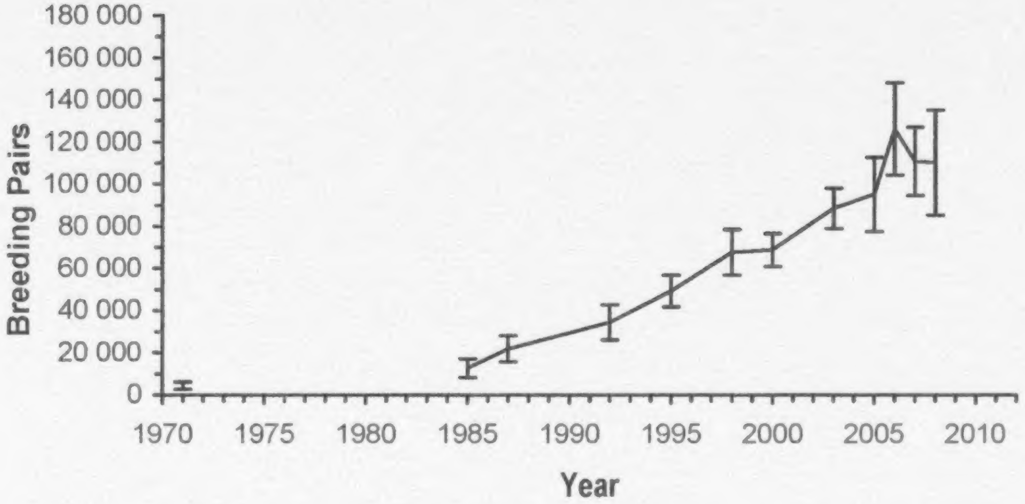


Figure 34. Breeding Pair Estimates for the Southern Ontario Population of Temperate-breeding Canada Geese (± 1SE)
(Source: J. Hughes, CWS, pers. Comm.)

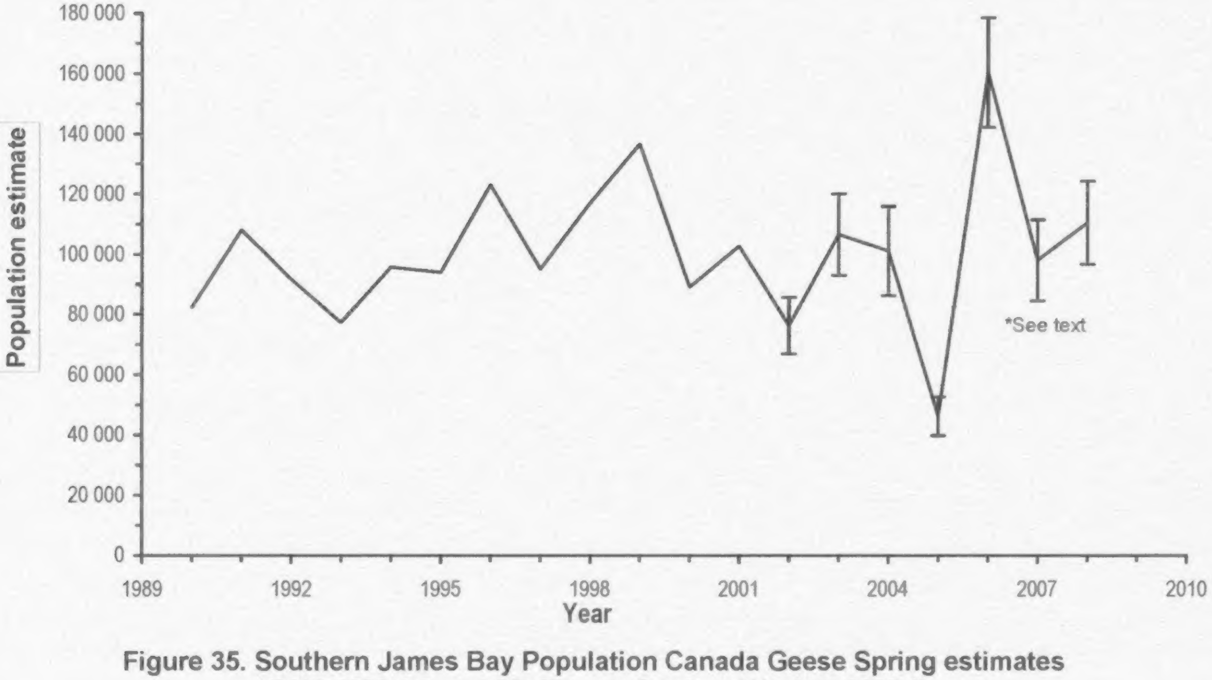


Figure 35. Southern James Bay Population Canada Geese Spring estimates
(2002-2008 data, ± 1 SE; [Source: Brook and Hughes, 2008a])

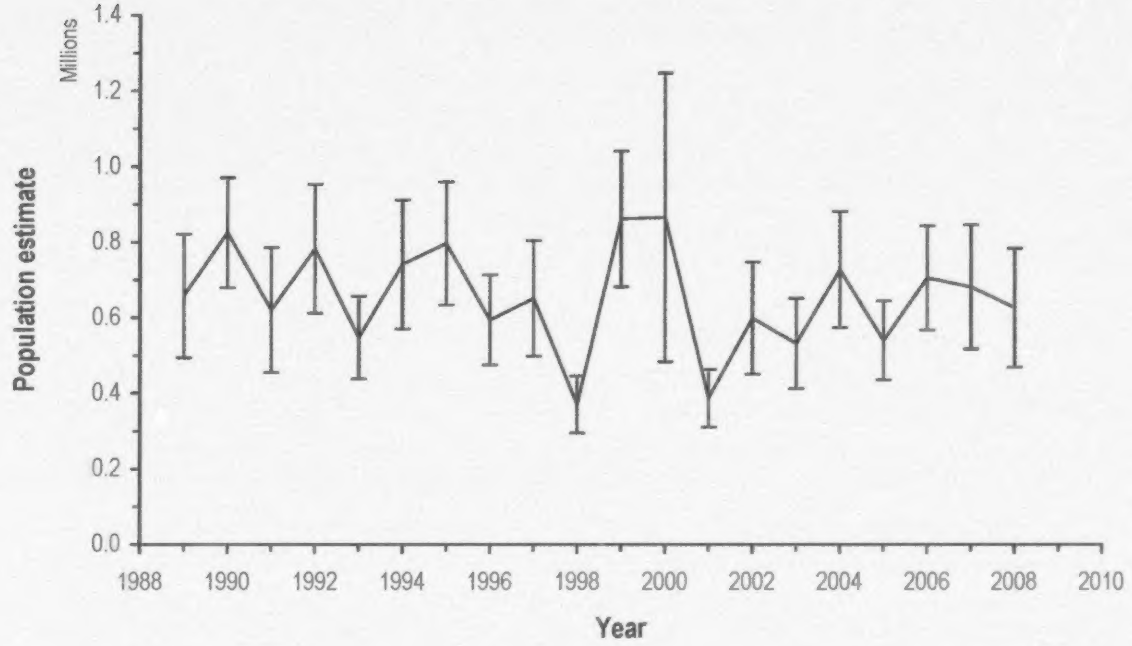


Figure 36. Mississippi Valley Population Canada Geese Spring Estimates (± 95% CI)
(Source: Brook and Hughes 2008b)

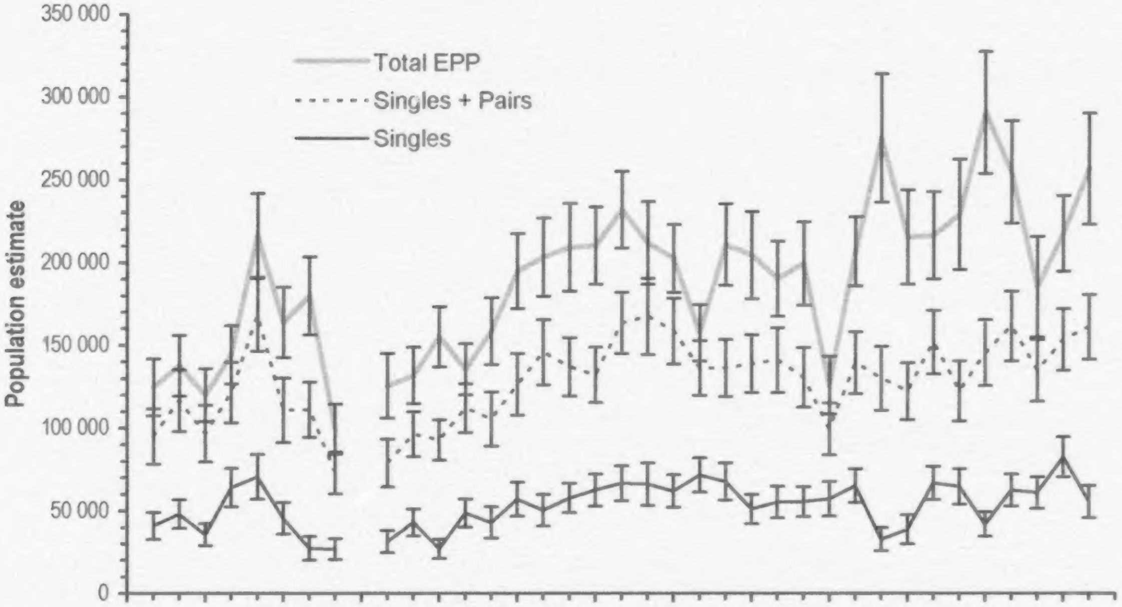


Figure 37. Eastern Prairie Population Canada Geese Spring Estimates (±95% C.I.)
(Source: Raedeke et al., 2008). No survey was conducted in 1980.

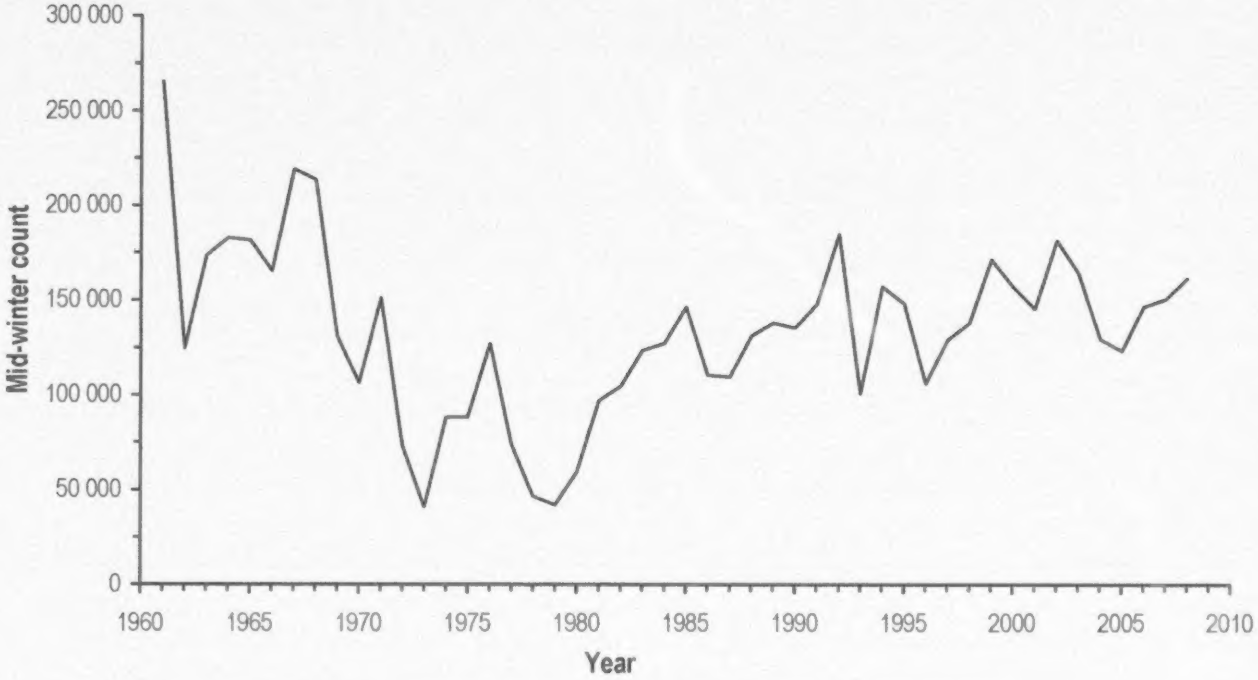


Figure 38. Mid-winter inventory of Atlantic Brant in the Atlantic Flyway
(Source : Padding et al., 2008)

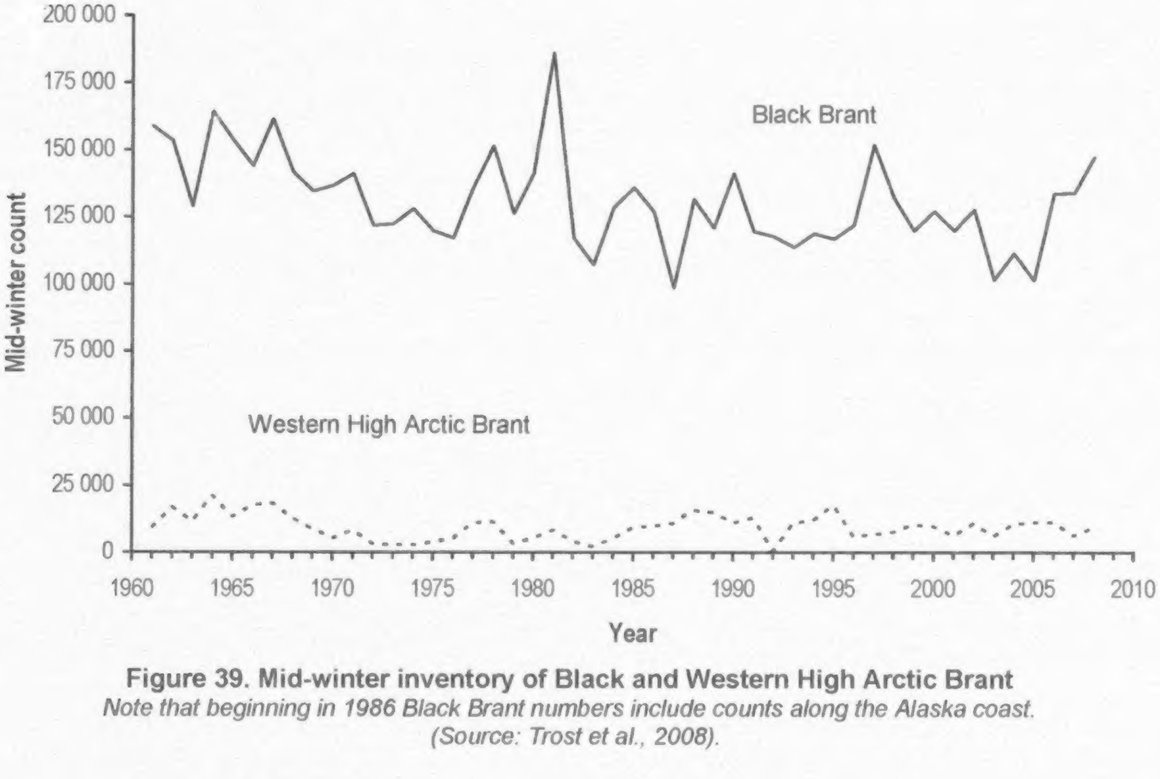


Figure 39. Mid-winter inventory of Black and Western High Arctic Brant
Note that beginning in 1986 Black Brant numbers include counts along the Alaska coast.
(Source: Trost et al., 2008).

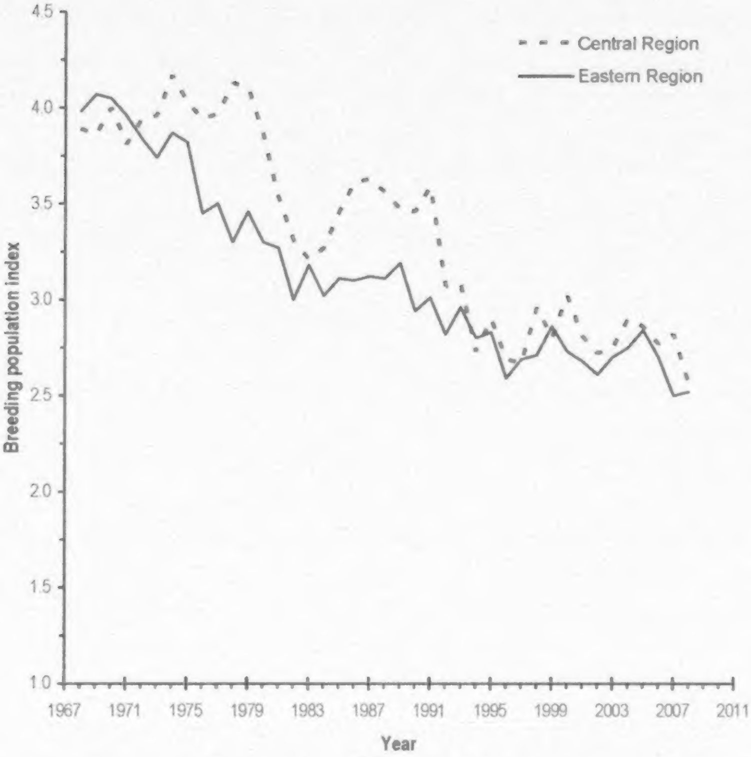


Figure 40. American Woodcock Breeding Population Indices
Indices (singing males per route) from the Singing-ground Survey (Source: Cooper et al. 2008).

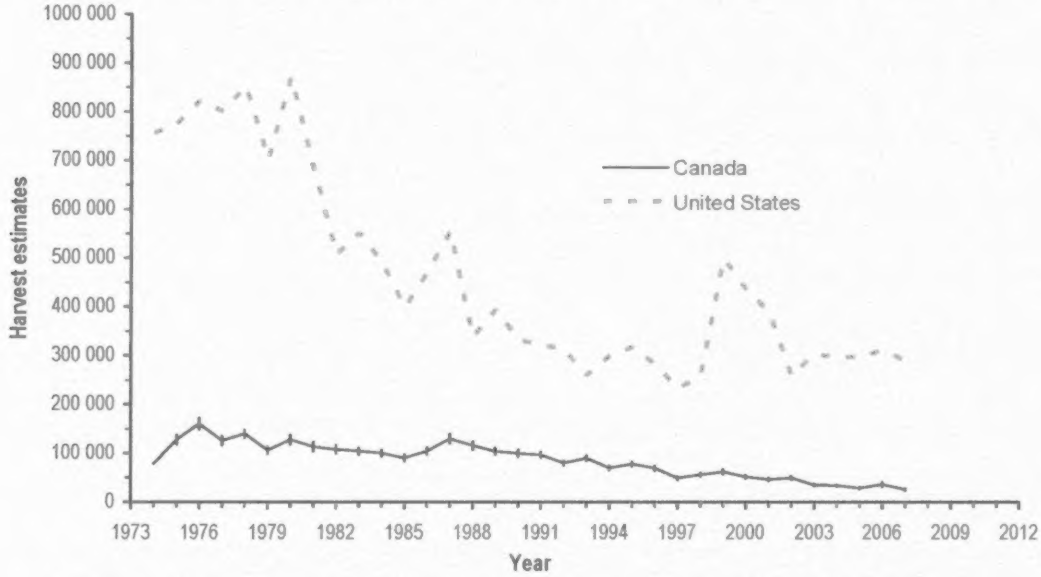


Figure 41. American Woodcock Harvest in Canada and the United States
(Source: M. Gendron & B. Collins, CWS, Cooper et al., 2008). The USFWS implemented an improved national harvest survey. The results from 1999 onward are considered preliminary and are not directly comparable to those prior to 1999.

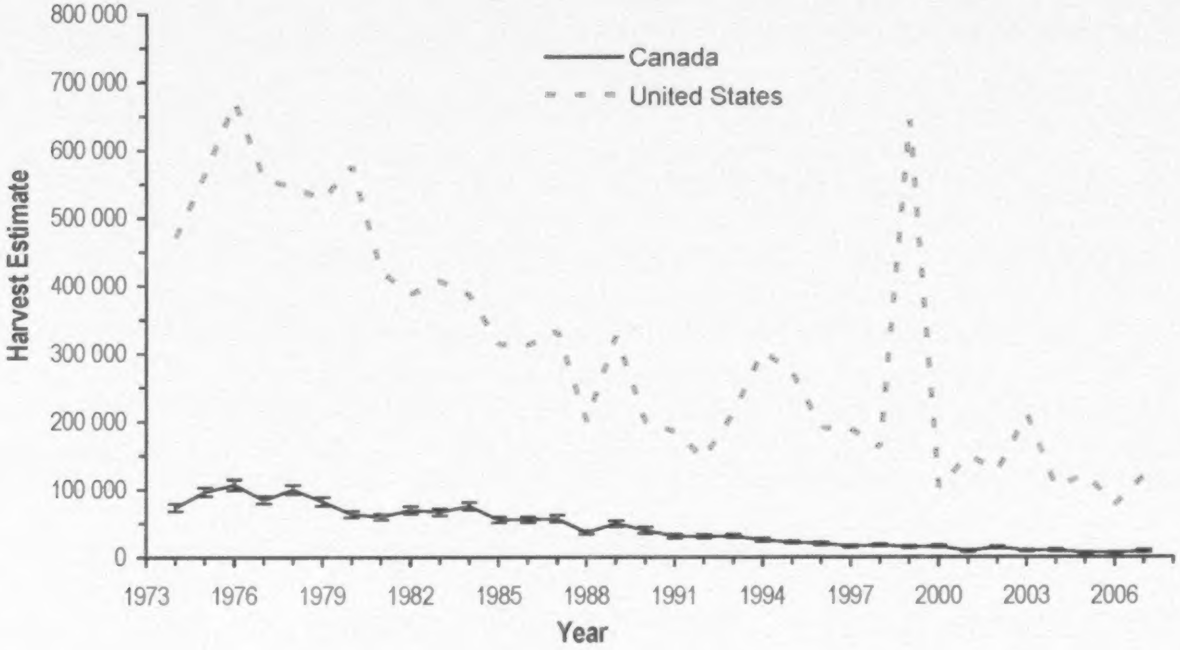


Figure 42. Wilson's Snipe Harvest Estimates in Canada and the United States
(Source: M. Gendron & B. Collins, CWS, and Kruse et al., 2008). The USFWS implemented an improved national harvest survey. The results from 1999 onward are considered preliminary and are not directly comparable to those prior to 1999.

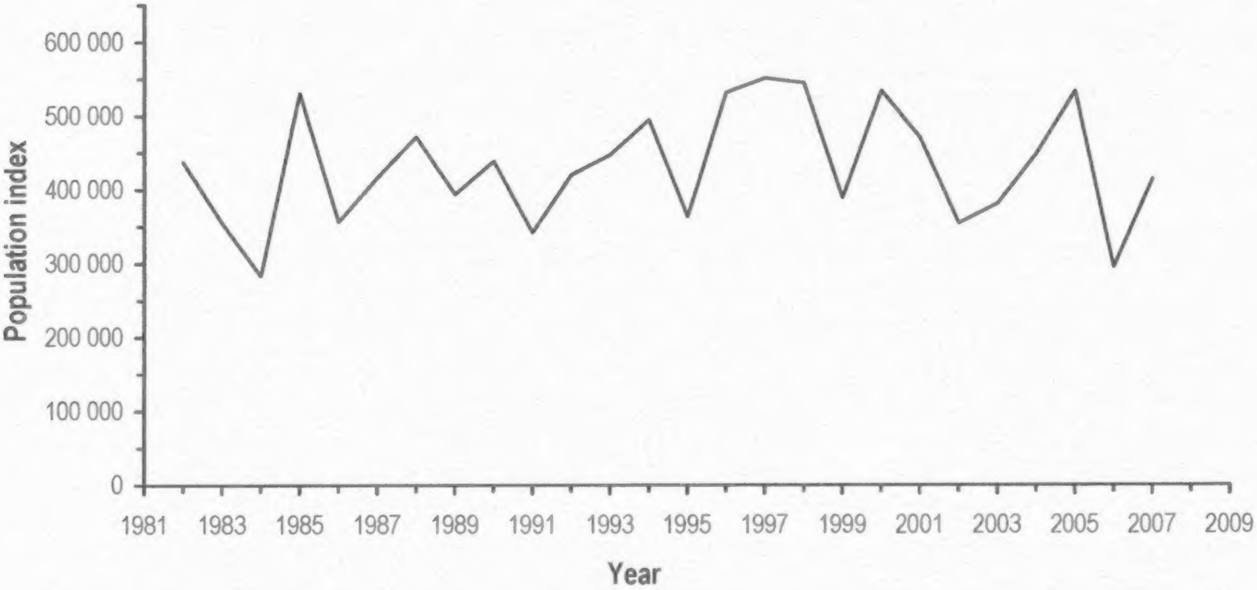


Figure 43. Mid-continent Population Sandhill Crane Spring Indices
Note: the 2008 value is for the Central Platte River Valley only, and is uncorrected for visibility bias (Kruse et al., 2008).

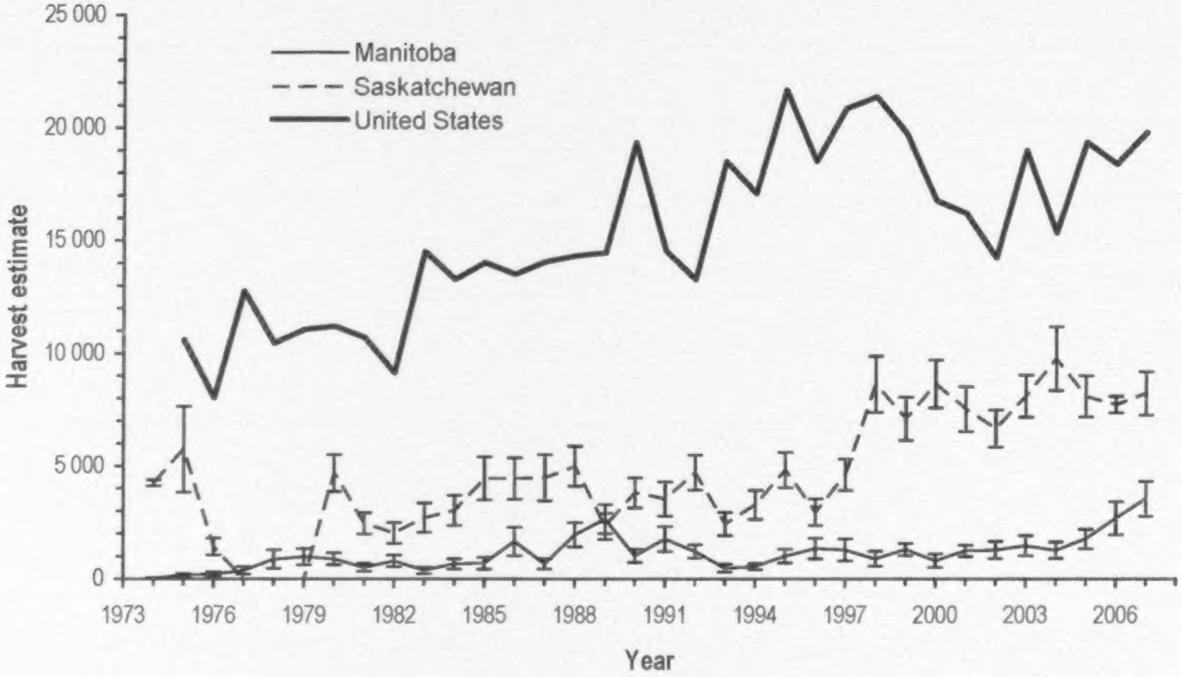


Figure 44. Harvest Estimates of Sandhill Cranes in Canada and the United States
Canadian harvest estimates ±1 SE (M. Gendron & B. Collins, CWS), and U.S. harvest estimates (K. L. Kruse et al., 2008).The USFWS implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

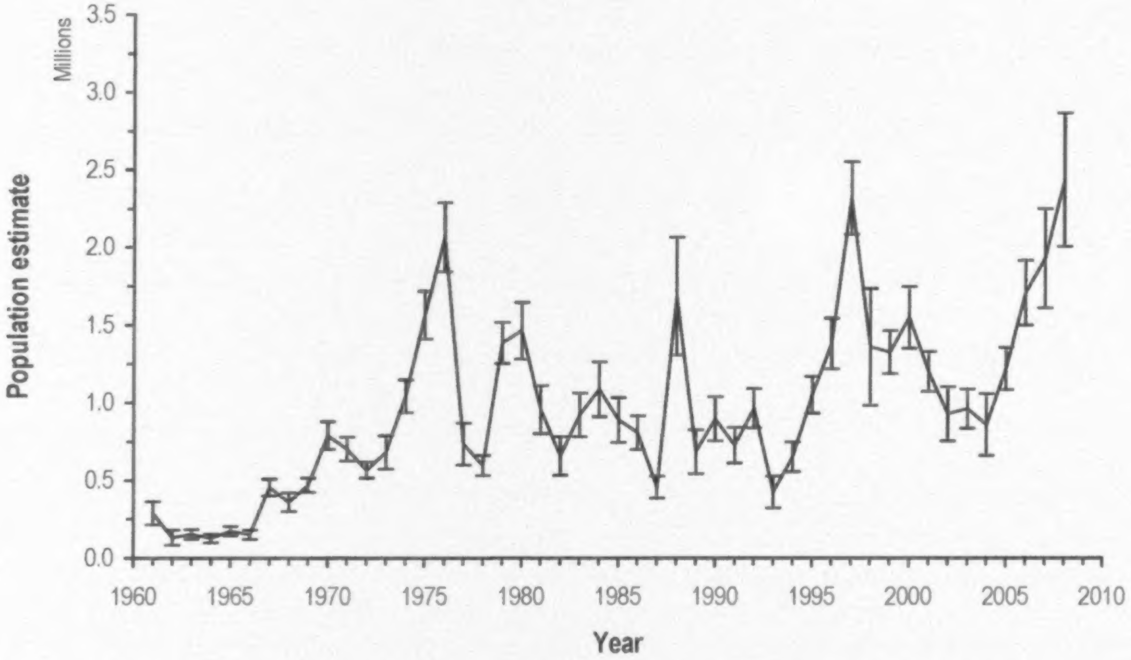


Figure 45. American Coot Breeding Population in the Canadian Prairies (± 1 SE) from the Waterfowl Breeding Population and Habitat Survey

Table 1. Inland duck species in southern Ontario; trends in indicated breeding pairs from 1971 to 2008. Data from breeding waterfowl surveys on ground and helicopter plots

	Long-term	Recent
Species	1971 - 2008	1992 - 2008
American Black Duck	-0.03	-0.03
Mallard	0.01	0
Wood Duck	0.03	0.03
Green-winged Teal	0.01	----
Blue-winged Teal	-0.09	-0.1
Ring-necked Duck	0.02	-0.01
Hooded Merganser	0	-0.04
Common Merganser	0.06	0.01

Data Source: Jack Hughes (CWS).

Note: Trends are expressed as an annual percentage change. Methods to test statistical significance of these trends have not yet been developed. No indication of significance can be given.

Table 2. Harvest estimates of American Black Ducks in Canada and the United States

	Canada													United States[1]				Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	Total	Total
1974	19 543	11 684	29 594	14 008	75 534	61 702	511						212 576	294 700	93 300	999	388 999	601 575
1975	35 354	14 620	59 467	21 876	90 593	85 070	262	118					307 360	275 000	81 000	1 197	357 197	664 557
1976	23 770	21 891	48 624	23 342	120 622	96 761	180	586	143	64			335 983	327 500	97 800	837	426 137	762 120
1977	38 835	18 044	46 186	20 568	129 618	82 886	727	547		48			337 459	194 900	78 900	249	274 049	611 508
1978	49 008	19 660	47 874	34 598	130 379	89 818	379			66			371 782	262 200	74 600	0	336 800	708 582
1979	44 658	12 732	33 687	24 339	112 926	87 557	242	363	256	266			317 026	231 000	68 300	0	299 300	616 326
1980	32 316	21 568	67 341	28 094	120 602	91 503	2 171	268					363 863	309 200	87 100	751	397 051	760 914
1981	38 047	16 133	58 692	26 460	105 733	76 298	337	213		41			321 954	230 900	59 000	505	290 405	612 359
1982	26 961	25 771	47 447	32 130	117 514	86 650	161	426					337 060	186 700	48 400	0	235 100	572 160
1983	32 956	25 049	57 725	31 007	101 637	60 454	259						309 087	139 100	58 800	317	198 217	507 304
1984	26 119	23 256	51 880	33 283	106 868	64 272	327		518				306 523	147 800	53 900	0	201 700	508 223
1985	28 556	18 535	44 397	32 261	110 998	64 692	427	135					300 001	148 100	41 700	180	189 980	489 981
1986	27 278	18 650	46 612	27 896	114 493	60 461	367	260	151				296 168	140 700	37 400	442	178 542	474 710
1987	20 184	18 114	39 138	27 218	129 612	61 176							295 442	135 400	36 700	112	172 212	467 654
1988	20 137	20 364	44 311	30 193	127 134	58 840		151	92				301 222	124 600	29 000	512	154 112	455 334
1989	29 299	11 548	47 322	25 582	99 675	47 518	144						261 088	148 800	44 600	326	193 726	454 814
1990	22 663	11 369	38 012	26 743	105 277	38 357	106	621	286	103			243 537	110 600	32 300	422	143 322	386 859
1991	15 073	14 499	39 295	20 122	85 220	48 670	1 189	312	1 329	229			225 938	126 400	40 900	220	167 520	393 458
1992	13 487	8 043	41 079	23 090	82 134	38 228	138	239	73				206 511	97 700	37 900	106	135 706	342 217
1993	13 133	10 741	36 298	19 591	87 869	34 556	1 125						203 313	105 400	41 200	66	146 666	349 979
1994	16 507	10 221	32 670	23 389	67 440	24 774	254	169				35	175 459	101 600	28 600	266	130 466	305 925
1995	15 461	13 355	40 546	29 332	54 776	33 470		204		17			187 161	126 500	42 300	0	168 800	355 961
1996	19 447	9 469	39 759	20 418	49 219	25 289							163 601	84 000	34 500	0	118 500	282 101
1997	18 816	12 982	32 666	17 966	56 103	26 309	265	147	215				165 469	110 200	41 500	79	151 779	317 248
1998	22 410	6 789	33 852	22 802	49 065	23 091	165		81	124			158 379	119 600	56 100	236	175 936	334 315
1999	19 058	10 782	44 658	22 445	51 385	26 579	36						174 943	111 400	42 200	0	153 600	328 543
2000	21 605	6 980	43 922	18 083	43 476	19 995	204	653					154 918	127 500	52 000	0	179 500	334 418
2001	16 800	9 465	26 729	12 879	38 717	19 185	293						124 068	94 559	30 636	0	125 195	249 263
2002	18 021	6 214	28 310	14 449	36 346	19 130		76	89				122 635	128 620	47 465	453	176 538	299 173
2003	10 174	7 228	26 010	15 219	35 077	15 176		334					109 218	95 108	33 971	134	129 213	238 431
2004	12 888	4 827	16 969	9 775	30 588	16 710							91 757	76 263	35 692	0	111 955	203 712
2005	9 333	4 560	16 717	9 031	34 472	15 276	191						89 580	93 406	36 365	115	129 886	219 466
2006	16 529	5 168	20 630	11 159	33 900	16 644							104 030	93 356	35 840	0	129 196	233 226
2007	20 485	7 054	24 180	10 391	27 596	13 462	140	503					103 811	98 705	38 692	0	137 397	241 208

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway.

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus et al. (USFWS).

Table 3. Estimates of trends in numbers of May ponds and Duck breeding populations in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey

Species	Time period	Region				
		Alaska	Western Boreal Canada	Canadian Prairies	U.S. Prairies	Entire survey area
		(11 strata)	(17 strata)	(15 strata)	(9 strata)	(52 strata)
May ponds[1]	1974-2008	N/A	N/A	-0.2 (15)	1.1 (9)	0.0 (24)
	1999-2008	N/A	N/A	5.1 * (15)	-3.9 (9)	1.9 (24)
	2004-2008	N/A	N/A	6.8 (15)	3.1 (9)	5.2 (24)
Total ducks[2]	1961-2008	1.7 * (11)	-0.3 (17)	-0.2 (15)	1.6 * (9)	0.3 (52)
	1999-2008	-1.3 (11)	-2.2 * (17)	3.2 (15)	-5.3 * (9)	-1.0 (52)
	2004-2008	0.0 (11)	0.5 (17)	10.2 * (15)	7.2 (9)	5.3 (52)
Mallard	1961-2008	3.3 * (11)	-0.4 (17)	-0.6 (15)	2.3 * (9)	0.3 (52)
	1999-2008	-3.3 * (11)	-5.4 (17)	-1.3 (15)	-3.6 * (9)	-3.1 * (52)
	2004-2008	-10.5 * (11)	2.6 (17)	5.6 * (15)	3.8 (9)	3.0 (52)
Gadwall	1961-2008	4.1 * (9)	3.3 (17)	1.5 * (15)	3.5 * (9)	2.4 * (50)
	1999-2008	-	-1.7 (14)	4.8 * (15)	-5.7 * (9)	-0.6 (41)
	2004-2008	-	-4.8 (13)	9.4 (15)	2.0 (9)	5.6 (40)
American Wigeon	1961-2008	3.8 * (11)	-0.9 * (17)	-2.4 * (15)	1.0 (9)	-0.2 (52)
	1999-2008	-1.0 (11)	-3.0 * (17)	1.5 (15)	-3.5 (9)	-1.5 (52)
	2004-2008	3.7 (11)	7.5 (17)	16.7 * (15)	0.2 (9)	7.2 * (52)
Green-winged Teal	1961-2008	4.3 * (11)	0.9 * (17)	0.3 (15)	1.4 * (9)	1.4 * (52)
	1999-2008	-1.7 * (11)	-1.1 (17)	6.8 (15)	-3.7 (8)	0.2 (51)
	2004-2008	-2.8 (11)	6.8 (17)	29.0 * (15)	-22.7 * (7)	7.3 * (50)
Blue-winged Teal	1961-2008	-	-0.4 (16)	0.7 (15)	1.7 * (9)	1.0 * (44)
	1999-2008	-	1.5 (12)	4.9 (15)	-6.7 (9)	-1.1 (37)
	2004-2008	-	3.4 (12)	14.8 * (15)	16.5 (9)	14.6 * (36)
Northern Shoveler	1961-2008	5.7 * (11)	0.8 (17)	1.6 * (15)	1.5 * (9)	2.0 * (52)
	1999-2008	-4.4 (11)	1.6 (17)	7.3 * (15)	-5.3 * (9)	1.7 (52)
	2004-2008	-7.8 (11)	10.0 * (15)	10.3 (15)	11.3 (9)	7.5 (50)
Northern Pintail	1961-2008	0.5 (11)	-2.4 * (17)	-2.9 * (15)	-1.7 * (9)	-1.8 * (52)
	1999-2008	-1.2 (11)	2.4 (16)	5.1 (15)	-5.6 * (9)	0.4 (51)
	2004-2008	8.7 * (11)	21.0 * (14)	2.0 (15)	6.2 (9)	6.6 * (49)
Redhead	1961-2008	3.4 (10)	0.2 (17)	1.2 * (15)	0.8 (9)	1.0 * (51)
	1999-2008	-	1.6 (13)	6.2 * (15)	-7.8 (9)	1.7 (40)
	2004-2008	-	2.9 (13)	23.8 * (15)	7.1 (9)	17.7 * (38)
Canvasback	1961-2008	1.0 * (11)	0.3 (17)	0.4 (15)	1.1 (9)	0.5 (52)
	1999-2008	-5.1 * (10)	-3.2 (16)	2.1 (15)	-0.0 (8)	-0.5 (49)
	2004-2008	-22.1 * (8)	-3.3 (13)	10.8 * (15)	-1.8 (8)	1.3 (44)
Scaup spp.	1961-2008	0.3 (11)	-1.5 * (17)	-0.9 * (15)	2.1 (9)	-1.0 * (52)
	1999-2008	0.4 (11)	-3.4 * (17)	-0.6 (15)	-4.0 (8)	-2.0 * (52)
	2004-2008	4.0 (11)	-2.5 (17)	5.0 (15)	-11.7 (8)	-0.2 (51)
Ring-necked Duck	1961-2008	9.4 * (11)	2.5 * (17)	1.9 * (15)	3.8 * (9)	2.7 * (52)
	1999-2008	1.9 * (9)	-2.0 (17)	-3.4 (14)	-9.8 (8)	-2.1 (51)
	2004-2008	-10.6 * (9)	-2.7 (17)	9.8 (14)	7.9 (8)	-2.1 (51)
Ruddy Duck	1961-2008	-	2.5 * (16)	1.5 (15)	2.6 * (9)	2.0 * (42)
	1999-2008	-	-7.1 (15)	3.7 (15)	-4.1 (8)	-0.7 (39)
	2004-2008	-	-26.2 * (12)	-2.6 (14)	17.8 (8)	0.2 (34)

Trends were calculated using the estimating equations technique (Link and Sauer 1994) and are expressed as an annual percentage change.

The number of strata is given in parentheses (a minimum of 5 strata was deemed necessary to perform a trend analysis).

* Trend significant at $p < 0.05$

[1] Adjusted May pond estimates for the U.S. Prairies are only available since 1974; pond estimates from strata 75 and 76 (Western Boreal Canada) which are counted since 1989 were excluded from the analysis.

[2] Total ducks include all species of ducks observed during the survey, including sea ducks.

Table 3 continued. Estimates of trends in numbers of May ponds and Duck breeding populations in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey

Species	Time Period	Region				Entire Survey Area (52 strata)
		Alaska (11 strata)	Western Boreal Canada (17 strata)	Canadian Prairies (15 strata)	U.S. Prairies (9 strata)	
Mergansers	1961-2008	5.5 * (11)	2.2 (17)	2.0 * (15)	2.8 * (8)	2.2 * (51)
	1999-2008	3.6 (11)	0.2 (17)	-1.9 (13)	-28.2 * (7)	-0.1 (48)
	2004-2008	5.7 (11)	-10.1 (17)	60.0 * (11)	-24.9 (5)	-7.7 * (44)
Goldeneyes	1961-2008	-0.4 (11)	1.4 (17)	3.1 * (14)	-0.6 (8)	1.3 * (50)
	1999-2008	0.1 (11)	-3.2 (17)	8.2 (13)	-	-1.4 (44)
	2004-2008	-13.2 * (11)	8.8 (17)	13.6 * (13)	-	7.3 * (43)
Bufflehead	1961-2008	0.2 (11)	1.7 * (17)	3.1 * (15)	2.7 * (8)	1.9 * (51)
	1999-2008	4.0 * (11)	1.2 (17)	3.2 (15)	-2.7 (8)	1.7 * (51)
	2004-2008	5.5 (9)	-1.4 (17)	5.8 (14)	18.7 (7)	0.4 (47)
Long-tailed Duck	1961-2008	-1.4 * (11)	-3.6 * (12)	-	-	-2.8 * (25)
	1999-2008	2.4 (11)	-6.1 * (8)	-	-	-1.8 (19)
	2004-2008	10.6 (11)	-21.6 (6)	-	-	-5.0 (17)
Scoter spp.	1961-2008	-0.3 (11)	-1.4 * (17)	-4.8 * (12)	-	-1.1 * (41)
	1999-2008	2.4 * (11)	-1.0 (17)	-	-	0.0 (32)
	2004-2008	0.2 (11)	-5.6 (16)	-	-	-3.7 (29)

* Trend significant at $p < 0.05$.

Table 4. Harvest estimates of Mallards in Canada and the United States

	Canada													United States[1] (including Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	154	130	406	761	50 036	191 532	105 723	366 291	488 448	62 595			1266 076	383 600	2 245 000	809 469	1 166 691	4 604 760	5 870 836
1975	774	405	972	583	57 791	296 173	159 142	587 985	521 935	122 725	1 698	797	1730 980	409 200	2 518 100	934 916	1 158 971	5 021 187	6 752 167
1976	770	256	753	748	71 851	322 047	204 598	606 239	609 576	114 198	3 229	898	1935 163	478 400	2 409 400	975 705	1 226 374	5 089 879	7 025 042
1977	836	196	1 155	992	81 835	268 878	165 257	391 986	510 396	131 066	3 073	584	1556 254	388 400	2 270 200	789 526	987 899	4 436 025	5 992 279
1978	850	259	2 659	452	61 507	322 006	239 298	395 276	382 319	115 038	2 098	1 290	1523 052	442 500	2 257 000	1 059 753	1 265 553	5 024 806	6 547 858
1979	555	465	3 077	725	70 597	266 018	245 016	419 509	485 014	117 176	1 182	1 673	1611 007	437 600	2 346 100	923 077	1 065 704	4 772 481	6 383 488
1980		948	3 056	1 436	82 027	290 941	210 152	355 042	480 188	104 768	2 551	2 473	1533 582	435 100	2 347 500	786 838	1 081 558	4 650 996	6 184 578
1981	2 945	1 461	2 536	2 491	91 946	279 541	175 213	231 119	392 273	114 672	1 703	1 033	1296 933	444 600	2 062 000	784 424	1 051 566	4 342 590	5 639 523
1982	438	410	1 406	1 792	93 288	335 813	148 862	241 734	296 124	92 492	1 552		1213 911	395 900	1 781 600	683 066	1 047 074	3 907 640	5 121 551
1983	1 067	937	4 044	2 557	87 349	297 944	160 521	284 403	364 000	121 758	2 417	603	1327 600	417 400	2 017 900	772 567	1 211 534	4 419 401	5 747 001
1984	1 097	738	2 120	1 668	67 432	284 128	117 207	183 300	306 234	89 453	4 501	1 366	1059 244	382 700	1 796 100	742 790	1 002 926	3 924 516	4 983 760
1985	794	1 149	3 310	3 258	97 037	293 333	87 172	158 302	180 117	81 943	4 153	914	911 482	319 900	1 532 900	510 761	957 871	3 321 432	4 232 914
1986	2 933	755	3 135	2 526	84 303	265 491	112 363	151 384	182 748	72 263	811	433	879 145	362 700	1 550 100	586 619	870 893	3 370 312	4 249 457
1987	1 020	728	3 692	3 141	116 452	315 101	136 678	154 961	211 929	75 591	1 120	192	1020 605	340 300	1 458 800	612 465	792 950	3 204 515	4 225 120
1988		902	2 304	1 620	83 748	233 556	64 324	75 853	139 565	63 700	2 543	412	668 527	257 200	874 500	324 709	532 958	1 989 367	2 657 894
1989	1 280	925	4 339	2 246	79 419	263 152	70 132	75 645	188 516	57 269	438	773	744 134	321 400	1 094 500	335 216	582 170	2 333 286	3 077 420
1990	1 162	1 028	3 557	3 185	86 524	261 267	60 851	79 494	175 921	60 395	866	290	734 538	267 000	1 091 000	326 984	602 541	2 287 525	3 022 063
1991	949	1 106	3 712	4 582	84 483	229 026	60 932	70 050	122 105	51 458	94	641	629 138	317 600	1 189 600	293 744	553 618	2 354 562	2 983 700
1992	863	199	6 407	5 243	87 824	196 647	65 991	68 765	94 795	52 172	605	298	579 809	294 100	1 250 400	366 488	627 239	2 538 227	3 118 036
1993	1 025	1 178	5 029	3 755	100 032	202 647	42 969	50 351	83 094	45 181	1 178	560	536 999	312 500	1 338 200	398 079	687 879	2 736 658	3 273 657
1994	795	864	3 305	2 894	107 222	197 833	57 923	88 848	113 068	50 412	2 042	205	625 411	328 500	1 524 700	510 957	744 432	3 108 589	3 734 000
1995	532	751	4 822	5 131	83 307	176 680	74 206	104 296	111 048	40 782	1 509	278	603 342	424 100	2 347 100	694 402	940 265	4 405 867	5 009 209
1996	351	1 024	4 286	4 044	82 201	176 869	91 265	121 608	115 668	42 447	1 326		641 089	408 000	2 493 900	764 215	1 185 491	4 851 606	5 492 695
1997	1 461	417	8 047	5 371	77 594	178 169	107 379	133 017	151 167	55 513	437	126	718 698	478 900	2 852 000	886 166	1 161 510	5 378 576	6 097 274
1998	1 628	1 011	5 440	7 512	76 320	164 431	104 469	129 461	119 826	52 663	861	276	663 918	445 500	2 762 800	953 367	1 428 079	5 589 746	6 253 664
1999[2]	1 188	667	6 305	4 866	69 568	131 901	82 637	182 714	105 126	48 002		220	633 194	438 000	3 060 800	878 434	1 121 810	5 499 044	6 132 238
2000	1 511	1 915	5 481	5 999	81 655	162 352	78 201	195 276	107 203	49 272	510	72	689 447	499 100	3 041 100	1 112 643	1 025 082	5 677 925	6 367 372
2001	600	1 192	5 720	7 046	79 895	166 628	92 114	107 411	94 698	35 574	642	229	591 749	467 064	2 768 031	1 151 367	997 216	5 383 678	5 975 427
2002	299	2 175	6 498	6 001	66 532	147 844	77 991	118 858	80 706	37 370	1 701	609	546 582	554 703	2 423 134	1 003 381	934 379	4 915 597	5 462 179
2003	694	803	4 711	6 509	58 871	138 096	66 402	126 396	73 086	35 383	409	109	511 469	427 301	2 571 468	942 199	1 078 236	5 019 204	5 530 673
2004	1 985	1 100	5 245	5 227	65 284	132 186	75 968	129 627	78 269	28 515	275	36	523 717	439 216	2 199 931	958 774	929 374	4 527 295	5 051 012
2005[3]	754	1 681	4 544	4 732	72 231	115 284	87 315	144 393	78 798	33 586	688		544 006	444 305	2 049 383	867 238	1 075 713	4 436 639	4 980 645
2006	753	1 122	5 460	6 389	72 245	124 751	111 026	174 174	88 533	28 928	215		613 626	399 651	2 286 643	709 241	1 272 876	4 668 411	5 282 037
2007	1 837	1 289	5 711	7 030	65 187	119 403	68 121	163 912	82 133	30 167	897	265	545 952	429 917	2 514 119	812 291	1 122 094	4 878 421	5 424 373

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska)

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus et al. (USFWS).

Table 5. Harvest estimates of Northern Pintails in Canada and the United States

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	939	820	659	790	14 043	8 296	7 545	39 226	69 214	14 281			155 813	34 500	122 900	162 518	928 387	1248 305	1404 118
1975	1 092	431	612	787	21 999	9 644	20 611	55 909	81 637	23 758	72	417	216 969	41 200	206 500	273 525	1045 461	1566 686	1783 655
1976	1 507	651	2 663	352	27 578	17 112	17 545	34 693	59 532	38 626	385	277	200 921	42 200	157 100	194 803	928 063	1322 166	1523 087
1977	2 438	1 653	1 717	607	39 581	14 333	11 243	20 469	69 905	29 464	137	313	191 860	50 700	213 700	179 906	540 749	985 055	1176 915
1978	824	829	1 892	1 039	21 298	13 077	21 072	14 051	38 039	22 830	698	216	135 865	35 800	210 600	239 442	851 665	1337 507	1473 372
1979	1 693	579	1 056	382	14 958	9 326	19 745	30 588	48 505	17 735	691	287	145 545	48 670	213 600	228 806	829 316	1320 392	1465 937
1980	905	510	757	1 384	16 722	13 248	12 872	16 868	44 003	21 392		108	128 769	38 600	215 600	193 055	633 316	1080 571	1209 340
1981	1 536	747	951	1 144	17 437	11 977	16 099	2 430	39 745	18 658	91	148	110 963	27 900	208 000	151 027	403 876	790 803	901 766
1982		1 531	1 009	1 479	20 791	10 946	13 290	12 598	29 130	14 021			104 795	38 600	126 500	158 668	467 585	791 353	896 148
1983	2 805	523	694	303	15 867	10 767	11 195	17 056	27 154	13 385	1 864	175	101 788	18 600	187 200	138 918	465 099	809 817	911 605
1984	1 698	1 047	717	908	9 253	10 132	13 131	12 343	34 016	19 661	168	337	103 411	34 600	153 500	165 663	312 492	666 255	769 666
1985	1 459	748	1 460	1 817	16 486	15 345	9 668	8 117	24 051	11 244		810	91 205	21 700	125 000	83 916	292 714	523 330	614 535
1986	634	565	846	1 841	13 163	9 057	6 988	9 077	8 632	8 885		296	59 984	19 000	90 200	72 074	274 961	456 235	516 219
1987	807	2 218	632	1 017	11 864	6 020	5 478	8 386	19 668	10 945		158	67 193	15 800	88 300	122 425	311 417	537 942	605 135
1988	1 998	1 449	486	715	12 160	8 019	13 779	5 320	14 667	10 831			69 424	7 200	39 200	36 392	116 308	199 100	268 524
1989	1 421	660	344	1 406	15 460	11 511	7 560	4 326	11 766	8 549	45		63 048	14 500	65 100	43 595	139 517	262 712	325 760
1990	4 114	450	653	1 707	19 568	8 231	5 279	10 087	13 483	7 750	281	41	71 644	10 500	49 400	43 207	133 164	236 271	307 915
1991	351	542	901	844	9 357	4 742	4 407	4 023	5 689	4 179	112	73	35 220	14 200	40 400	28 687	126 414	209 701	244 921
1992		910	79	464	6 221	4 861	5 236	2 126	6 914	6 393	136	77	33 417	12 200	56 200	31 508	116 250	216 158	249 575
1993	1 090	1 336	852	706	11 401	5 156	5 172	3 253	4 025	4 701	61		37 753	13 000	52 300	42 486	140 620	248 406	286 159
1994	934	765	1 163	1 136	11 307	4 649	4 866	7 302	7 518	4 738		64	44 442	18 000	81 100	61 088	150 361	310 549	354 991
1995	1 727	454	965	1 240	7 831	4 552	8 974	6 521	7 573	4 476			44 313	32 700	136 200	94 351	259 351	522 602	566 915
1996	1 246	478	897	1 234	5 043	4 011	10 323	14 477	9 621	5 367			52 697	19 200	124 000	95 340	281 630	520 170	572 867
1997	785	139	116	493	7 423	5 560	13 248	13 656	13 883	5 422	37		60 762	23 800	145 000	186 191	340 419	695 410	756 172
1998	1 026		653	757	7 735	6 361	14 347	11 099	11 119	6 462	19	276	59 854	33 100	177 000	123 391	238 677	572 168	632 022
1999[2]	390	1 137	755	1 790	8 956	6 457	9 830	10 610	10 304	5 464		0	55 693	25 200	148 299	133 317	232 704	539 520	595 213
2000	470	509	499	581	6 480	5 397	8 766	16 168	13 603	5 825	50		58 348	20 752	155 082	134 252	201 163	511 249	569 597
2001	137		400	610	4 910	3 708	9 215	7 050	8 730	4 806	18	59	39 643	19 276	122 522	135 039	158 115	434 952	474 595
2002	1 153	77	542	702	5 526	9 908	13 878	13 053	7 640	4 549			57 028	17 089	102 481	60 469	143 370	323 409	380 437
2003	571	598	227	1 270	6 794	10 420	8 998	8 687	8 204	1 947	234		47 950	18 134	123 318	55 080	144 581	341 113	389 063
2004	30	316	129	701	6 393	5 207	12 623	23 801	8 379	2 361			59 940	11 226	90 542	62 724	141 540	306 032	365 972
2005[3]	256	313	308	536	4 677	3 178	6 653	13 450	10 769	3 675			43 815	17 339	107 276	78 610	203 037	406 262	450 077
2006	176	939	90	382	5 067	4 861	8 579	11 853	12 527	2 004	39		46 517	20 282	104 286	66 313	239 460	430 341	476 858
2007	228	584	660	634	5 533	5 059	13 329	18 054	10 085	2 410	224		56 800	19 076	162 416	88 770	258 906	529 168	585 968

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus et al. (USFWS).

Table 6. Harvest estimates of Lesser Scaup in Canada and the United States

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	3 601	37	688	731	22 326	43 359	16 244	10 698	9 432	1 612			108 728	35 900	330 800	58 855	23 575	449 130	557 858
1975	6 323	166	1 450	943	28 681	43 739	21 748	10 861	18 870	2 661	369	661	136 472	33 200	250 400	48 734	24 456	356 790	493 262
1976	656	89	1 139	238	34 714	50 152	27 108	16 747	14 470	2 243	169	386	148 111	59 100	326 700	96 295	49 009	531 104	679 215
1977	1 033	61	3 552	146	31 895	46 505	11 010	7 250	8 363	3 474	799	237	114 325	199 100	364 400	75 724	45 312	684 536	798 861
1978	1 666	43	1 857		23 451	26 854	14 537	10 400	13 551	3 114	215	341	96 029	39 500	177 300	59 233	38 782	314 815	410 844
1979	241		751	51	26 706	35 097	15 433	7 646	10 827	1 799	571		99 122	19 500	144 600	46 798	40 581	251 479	350 601
1980	2 844	73	662	746	28 850	55 807	27 541	4 910	13 112	1 906	599		137 050	21 100	154 300	34 618	25 958	235 976	373 026
1981	1 607		704	735	31 991	58 463	18 807	3 225	8 980	1 224	507	148	126 391	97 000	325 200	92 567	33 140	547 907	674 298
1982	126		387	309	20 981	37 287	27 394	6 655	13 226	1 721			108 086	39 000	241 000	45 835	31 038	356 873	464 959
1983	471	104	550	575	19 171	42 320	22 289	9 122	6 551	103		78	101 334	34 000	154 500	36 870	43 476	268 846	370 180
1984	1 695	31	352	912	17 696	53 451	18 336	10 861	5 435	975	98	74	109 916	83 900	380 800	151 243	45 752	661 695	771 611
1985	874		365	951	25 866	61 409	15 356	2 498	6 604	1 240	831		115 994	80 600	305 800	71 563	28 489	486 452	602 446
1986	1 839		430	1 646	23 080	47 546	14 674	5 382	5 974	1 191	170		101 932	20 700	164 000	44 452	18 909	248 061	349 993
1987	339	290	615	541	11 981	34 512	10 400	7 129	5 458	1 140		12	72 417	23 100	97 100	44 633	20 408	185 241	257 658
1988		87	943	544	22 429	32 983	6 885	5 019	3 341	496	424		73 151	26 100	84 900	28 418	9 202	148 620	221 771
1989	2 063	52	1 237	1 119	26 710	42 316	7 296	1 347	3 073	608	179		86 000	24 900	69 200	24 097	8 636	126 833	212 833
1990	1 757	35	1 051	1 696	24 047	25 772	6 592	2 557	3 888	778	191		68 364	13 300	58 900	17 035	12 992	102 227	170 591
1991	272		481	455	18 402	31 204	9 226	3 864	2 464	428	37		66 833	11 400	102 600	20 639	15 549	150 188	217 021
1992	1 004		171	116	15 249	24 587	8 227	778	2 320	650	33		53 135	13 200	132 300	28 886	12 712	187 098	240 233
1993	2 231		401	690	20 912	35 173	6 228	2 196	1 628	452	35	40	69 986	13 200	63 700	15 691	13 673	106 264	176 250
1994	510	99	445	244	11 479	27 137	12 344	2 742	3 247	378		52	58 677	20 400	102 000	34 342	20 232	176 974	235 651
1995			334	730	8 705	27 465	14 185	2 263	2 926	242			56 850	26 900	189 000	37 875	31 645	285 420	342 270
1996	178		331	156	7 460	17 344	9 258	2 415	2 800	1 162	331		41 435	35 700	293 800	92 121	38 166	459 787	501 222
1997	232		512	782	6 529	19 843	5 185	4 262	4 863	1 302	431		43 941	41 600	359 800	80 581	28 189	510 170	554 111
1998	1 455		223	1 300	11 513	16 069	5 400	6 287	2 695	311			45 253	61 500	319 300	149 241	30 138	560 179	605 432
1999[2]	470		131	110	8 339	19 599	10 233	2 143	939	181			42 145	70 900	82 900	34 358	21 991	210 149	252 294
2000	26			49	5 071	9 781	11 987	1 284	1 768	178	74	130	30 348	32 400	206 900	85 845	24 798	349 943	380 291
2001	414		60	138	5 082	13 530	8 117	1 777	861	119	128	8	30 234	97 228	165 746	71 646	29 515	364 135	394 369
2002	1 436	548	412	843	5 576	14 259	6 007	1 524	1 791	383		174″	32 953	84 399	185 381	84 695	35 972	390 447	423 400
2003	682	183	433	265	8 602	11 995	2 376	3 980	2 311	175	117		31 119	60 939	153 617	44 850	39 190	298 596	329 715
2004	814		27	186	3 619	9 859	7 362	921	1 593	291			24 672	66 091	108 534	66 727	51 531	292 883	317 555
2005	381	304	189	266	3 459	10 088	4 683	2 520	1 777	120			23 787	63 698	111 357	54 404	28 105	257 564	281 351
2006	250		172	436	7 219	16 425	4 459	865	2 058	46	97		32 027	46 619	101 219	51 148	33 973	232 959	264 986
2007	146	47	341	209	1 953	10 813	10 291	907	5 852		224		30 783	46 594	84 791	40 963	51 092	223 440	254 223

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus (USFWS).

Table 7. Harvest estimates of Greater Scaup in Canada and the United States

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	1 788	314	1 620	488	20 243	18 172	572	532		1 039			44 768	41 800	23 882	1 559	9 823	77 064	121 832
1975	1 321		2 401	283	25 353	36 056	1 136	176	1 215	2 986	69		70 996	29 400	24 342	1 160	10 488	65 390	136 386
1976	3 095		3 522	478	28 190	37 526	1 140	291		1 297			75 539	64 800	20 426	780	11 056	97 062	172 601
1977	2 436	217	1 895	244	21 126	44 900				617		64	71 499	55 300	26 696	3 778	29 157	114 931	186 430
1978	1 611		502	141	17 811	20 465	1 782			320		77	42 709	71 400	20 673	1 787	7 802	101 662	144 371
1979	637		959	97	20 315	26 367	677			1 391			50 443	28 400	13 523	385	7 442	49 750	100 193
1980	3 052	147	738	384	18 922	29 535	720			739			54 237	17 900	17 660	1 661	11 518	48 739	102 976
1981	344		170	818	22 891	23 762	1 139			548			49 672	34 600	27 834	4 137	19 712	86 283	135 955
1982	1 476	63	411	584	15 678	15 797				230			34 239	73 000	11 799	1 381	4 712	90 892	125 131
1983	427		1 289	574	13 443	38 628				924			55 285	22 800	30 966	623	13 454	67 843	123 128
1984	2 565	31	1 098	1 125	18 999	22 538	419	561	133	907			48 376	27 900	23 416	2 746	13 170	67 232	115 608
1985	2 423	428	759	272	17 880	28 128	1 022			134		63	51 109	31 700	21 169	1 517	5 627	60 013	111 122
1986	5 095	404	2 213	1 456	11 638	30 320	970	214	151	1 112			53 573	36 400	10 307	844	7 612	55 163	108 736
1987	1 103		672	1 323	6 941	13 103	746	131		318			24 337	18 000	11 445	1 450	8 817	39 712	64 049
1988	920		3 221	585	13 622	13 859				212			32 419	12 300	6 678	1 381	5 843	26 202	58 621
1989	5 264	51	2 547	1 498	9 380	14 701			182	242			33 865	14 300	6 620	317	3 845	25 082	58 947
1990	3 684	79	1 609	420	9 284	11 959	383		195	81			27 694	7 200	12 257	1 305	5 844	26 606	54 300
1991			1 657	267	6 314	9 815	626	474	387	153			19 693	6 700	5 541	1 930	4 706	18 877	38 570
1992	1 360		805	898	4 830	9 913	298			87			18 191	6 100	7 947	1 217	4 101	19 365	37 556
1993	5 959	176	1 161	362	8 589	8 651	163				21		25 082	8 600	11 522	1 036	5 994	27 152	52 234
1994	706		1 501	307	6 550	8 329	306			26			17 725	6 700	13 146	2 936	6 477	29 259	46 984
1995	508	82	920	542	5 080	12 861	268			97			20 358	14 600	19 758	5 204	13 456	53 018	73 376
1996	596	65	772	914	5 839	7 653	286		297				16 422	11 900	21 391	2 871	13 572	49 734	66 156
1997	677	83	919	1 119	3 627	6 002	157			379			12 963	9 700	23 636	12 687	16 860	62 883	75 846
1998	1 703	169	256	1 878	4 055	4 274	165		162				12 662	12 600	15 353	5 375	12 384	45 712	58 374
1999[2]	1 377		332	55	4 171	4 671	929					3	11 538	10 900	9 138	3 282	12 016	35 336	46 874
2000	1 075		1 157	659	2 961	3 190	120						9 162	12 800	15 644	1 912	12 097	42 453	51 615
2001	1 210		234	1 492	1 537	4 276	747			18			9 514	7 582	8 060	1 811	15 249	32 702	42 216
2002	1 125	77	437	1 517	2 725	4 816	690				151	*	11 538	17 809	30 216	3 591	20 642	72 258	83 796
2003	576	366	524	337	2 100	5 481			173			*	9 557	17 344	14 469	1 257	16 122	49 192	58 749
2004	964	39	90	503	3 040	7 029	285		161	26		*	12 137	17 254	28 056	3 782	22 035	71 127	83 264
2005	447		193	536	1 562	2 840	235						5 813	18 237	24 812	2 518	11 645	57 212	63 025
2006	705	287	191	430	4 002	3 010					19		8 644	10 523	21 454	2 746	13 057	47 780	56 424
2007	619	101	91	165	815	6 764	88			29		*	8 672	13 154	21 964	3 085	32 630	70 833	79 505

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway (including Alaska)

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus et al. (USFWS).

Table 8. Harvest estimates of Canvasbacks in Canada and the United States.

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF	Total	Total
1974					1 461	7 530	3 904	5 647	3 344	773			22 659	700	16 200	19 281	38 768	74 949	97 608
1975					2 116	18 757	8 205	9 065	4 262	1 051		17	43 473	1 700	30 500	15 898	45 663	93 761	137 234
1976				20	2 117	17 817	5 321	7 454	3 773	1 360			37 862	23 200	34 000	18 002	51 799	127 001	164 863
1977					1 036	6 162	2 770	4 019	2 076	198		44	16 305	7 100	24 700	10 831	32 486	75 117	91 422
1978					3 293	11 996	4 596	4 544	2 424	233			27 086	5 600	20 400	7 003	31 089	64 092	91 178
1979					3 769	14 208	7 922	7 585	2 239				35 723	9 200	39 300	17 320	26 027	91 847	127 570
1980					3 301	10 966	4 746	1 420	5 431	1 269			27 133	8 200	27 200	7 800	23 129	66 329	93 462
1981					625	8 327	3 883	1 066	5 193	534			19 628	6 200	20 000	4 898	24 932	58 030	77 658
1982					1 440	6 223	7 669	3 236	344				18 912	3 200	13 900	8 130	19 820	45 050	63 962
1983					400	10 970	6 696	2 638	4 040	240			24 984	14 300	31 000	14 207	21 601	81 108	106 092
1984					214	6 279	1 819	4 716	3 620	210		37	18 895	8 500	23 000	14 215	25 548	71 263	90 158
1985					1 435	8 673	3 349	3 617	1 427	201			18 702	9 000	23 200	10 417	37 309	79 926	98 628
1986	216		461		1 082	14 385	3 145	5 242	3 951	956	53		29 491	200	600	1 064	22 119	23 983	53 474
1987					503	6 158	2 945	638	709	463			11 416	100	800	783	17 714	19 397	30 813
1988					504	2 153	2 744	1 491	385	230			7 507	100	100	190	436	826	8 333
1989						3 636	1 255	219	869	45	45		6 069	300	500	333	9 749	10 882	16 951
1990						5 902	1 392	508	697		23		8 522	100	400	334	7 069	7 903	16 425
1991					198	4 206	473	2 473	1 855	98			9 303	0	200	360	7 163	7 723	17 026
1992					134	3 194	788	282	194	35			4 627	0	300	91	11 190	11 581	16 208
1993					88	1 602	2 505	1 862	570	25			6 652	0	200	257	12 765	13 222	19 874
1994						1 331	3 695	1 141	1 843	164			8 174	4 700	31 300	13 351	20 035	69 386	77 560
1995						5 444	4 016	1 303	1 542	119			12 424	13 200	59 800	19 482	15 749	108 231	120 655
1996					74	4 219	2 965	3 914	1 385				12 557	20 100	49 600	17 851	21 666	109 217	121 774
1997						7 585	5 802	1 708	1 387	55			16 537	12 200	59 800	22 731	25 905	120 636	137 173
1998						5 266	2 012	392	663	83	233		8 649	7 500	36 800	21 639	27 109	93 048	101 697
1999[2]						2 133	5 065		787	51			8 036	6 200	41 100	21 221	19 650	88 171	96 207
2000					111	3 085	4 022	588	1 095	0	12		8 913	16 500	44 100	25 485	17 570	103 655	112 568
2001						896	4 223	411	464	136			6 130	1 546	11 334	13 855	9 490	36 225	42 355
2002						951	3 195	756	253	95			5 250	0	604	1 152	953	2 709	7 959
2003						971	5 962	1 325	954	55			9 267	4 738	11 259	7 855	11 532	35 384	44 651
2004					57	1 837	2 026	428	145				4 493	9 772	10 824	8 857	14 945	44 398	48 891
2005						971	7 563	3 716	825	82			13 157	4 433	32 786	17 487	9 362	64 068	77 225
2006						3 173	4 131	2 633	320	15	19		10 291	1 228	45 640	18 093	26 925	91 886	102 177
2007						1 812	2 344	4 905	3 334	26			12 421	6 988	56 432	15 719	46 068	125 207	137 628

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus et al. (USFWS).

Table 9. Black Scoters Harvest estimates in Canada and the United States

	Canada													United States[1] (includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT-NU	YT	Total	AF	MF	CF	PF[2]	Total	Total
1974	2 239		1 300	17	5 555	3 646							12 757	21 000	3 266	52	0	24 318	37 075
1975	126		2 788		11 105	11 628					23		25 670	16 100	2 687	0	246	19 033	44 703
1976	2 711		5 231	245	17 217	6 853							32 257	8 900	2 159	169	274	11 502	43 759
1977	5 210	94	3 547	40	25 536	3 671				90	198		38 386	15 300	4 368	133	142	19 943	58 329
1978	365		2 106		6 351	1 999				92			10 913	7 900	242	0	0	8 142	19 055
1979	1 830		3 078	43	11 455	1 973					85	107	18 571	11 800	1 095	69	0	12 964	31 535
1980	1 195		1 104		12 065	912							15 276	5 400	2 430	0	0	7 830	23 106
1981	3 406		5 231	165	11 438	2 883				55			23 178	8 700	3 213	185	145	12 243	35 421
1982	6 158		2 769		6 574	967							16 468	4 100	1 068	355	0	5 523	21 991
1983	880		2 308	49	5 390	2 303				37			10 967	3 600	580	0	154	4 334	15 301
1984	2 024		1 536		7 756	2 074	330			57			13 777	10 600	749	94	206	11 649	25 426
1985	884	209	1 094		7 005	3 502							12 694	13 500	2 299	76	0	15 875	28 569
1986	579		3 127		2 314	2 795						34	8 849	6 800	412	0	0	7 212	16 061
1987	572		1 359	678	7 195	843	414						11 061	9 900	228	0	0	10 128	21 189
1988	147		1 124	441	3 430	714							5 856	5 500	198	0	0	5 698	11 554
1989	463		650		5 006	705							6 824	5 400	1 365	0	50	6 815	13 639
1990	377		1 114	202	3 856	1 455							7 004	12 000	148	0	35	12 183	19 187
1991	783		2 330	94	3 253	907							7 367	6 600	0	0	0	6 600	13 967
1992	969		1 769		1 477	669						24	4 908	4 600	315	0	0	4 915	9 823
1993	570		1 166		4 882	656	618						7 892	3 000	634	41	49	3 724	11 616
1994	298		3 216	54	2 297	549	971			29		165	7 579	5 700	1 198	54	0	6 952	14 531
1995	1 543		1 978	149	679	563							4 912	3 000	100	0	0	3 100	8 012
1996	568		1 000	32	1 598	378							3 576	4 800	463	203	211	5 677	9 253
1997			1 324	43	2 202	205							3 774	4 500	940	105	123	5 668	9 442
1998	1 212	14	985	51	2 752	186							5 200	3 200	688	0	0	3 888	9 088
1999[3]	524		1 002		1 620	464							3 610	7 800	900	200	700	9 600	13 210
2000	29		1 354	677	497	260							2 817	5 300	1 000	0	0	6 300	9 117
2001	928		2 646		947	682							5 203	5 800	800	0	0	6 600	11 803
2002	838	158	1 462	72	610	243							3 383	10 800	800	0	0	11 600	14 983
2003	536		821	74	655	221							2 307	17 800	1 800	0	800	20 400	22 707
2004			1 737	36	790	96							2 659	11 400	900	100	1 400	13 800	16 459
2005	754		1 580		239								2 573	16 853	2 537		1 140	20 530	23 103
2006	250		740		1 215	288							2 493	8 498	619	311	215	9 643	12 136
2007			277		393	227							897	7 466	1 529	127	0	9 122	10 019

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2] Includes Alaska

[3] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. Gendron and B. Collins (CWS), and K.D. Richkus (USFWS).

Table 10. White-winged Scoters Harvest estimates in Canada and the United States.

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF[2]	Total	Total
1974		113	1 105	46	9 676	4 611	291		251	174			16 267	26 700	6 393	0	424	33 517	49 784
1975			1 742	233	4 934	4 277	141		357	143		54	11 881	33 000	1 944	117	125	35 186	47 067
1976	95	204	2 792	193	8 245	4 122	396		648	61		164	16 920	18 100	497	565	1 010	20 172	37 092
1977			2 253		10 277	4 393	183		118	57		247	17 528	12 200	2 341	257	1 531	16 329	33 857
1978	1 105	153	417	283	5 042	3 310		381	334	265			11 290	12 100	205	0	3 534	15 839	27 129
1979	565		989	117	8 018	5 845		364	172				16 070	8 730	966	0	748	10 444	26 514
1980	3 483		3 497	92	10 829	3 142				102			21 145	13 900	2 284	34	792	17 010	38 155
1981	728		1 231	114	7 831	2 510				689	116		13 219	11 900	1 644	126	1 172	14 842	28 061
1982	767		1 459	151	7 798	2 000			1 484	1 259			14 918	13 900	1 269	0	172	15 341	30 259
1983	710		1 418	199	7 842	2 470		516		162			13 317	9 600	2 339	0	177	12 116	25 433
1984	1 645	30	2 253		11 052	3 636					408		19 024	27 800	2 283	0	3 970	34 053	53 077
1985	1 028		791	97	7 792	2 892	283		252	66	1 661		14 862	19 300	2 074	36	425	21 835	36 697
1986	215		401	46	2 359	1 443		213		297			4 974	9 300	1 142	0	276	10 718	15 692
1987			1 090	90	6 950	3 618			106	78			11 932	20 300	2 885	101	1 019	24 305	36 237
1988	2 190		1 963	60	7 072	1 403				51			12 739	17 500	1 086	0	134	18 720	31 459
1989	202		1 515	128	8 078	1 858							11 781	7 100	1 197	70	43	8 410	20 191
1990	899		2 200	139	5 297	801	789						10 125	14 690	546	0	238	15 474	25 599
1991			465	90	2 505	1 096							4 156	18 391	1 036	312	88	19 827	23 983
1992	283		1 638		5 213	441							7 575	10 992	661	151	0	11 804	19 379
1993	544	379	1 238	123	4 415	2 041	162				35		8 937	8 293	380	0	247	8 920	17 857
1994	344		2 132		5 932	1 343							9 751	5 594	738	111	240	6 683	16 434
1995			1 846		1 795	672							4 313	7 995	314	0	239	8 548	12 861
1996	89		1 034		2 464	1 175							4 762	9 996	3 478	119	361	13 954	18 716
1997	58		1 191		2 306	470							4 025	6 800	568	0	499	7 867	11 892
1998	598		758	198	3 363	291							5 208	4 700	632	0	787	6 119	11 327
1999[3]	41		412		1 337	260						3	2 053	2 200	0	200	1 100	3 500	5 553
2000	47		313		527	104					24		1 015	4 900	0	100	1 200	6 200	7 215
2001	72		227	199	1 021	379	159	157		26			2 240	15 100	1 500	0	6 600	23 200	25 440
2002		158	680	52	1 179	282							2 351	7 300	800	200	800	9 100	11 451
2003	409		636	43	789	97			173				2 147	6 800	1 900	200	2 200	11 100	13 247
2004			156		1 238	137							1 531	6 800	1 900	200	2 200	11 100	12 631
2005			151	34	908	78							1 171	4 215	793	113	1 426	6 547	7 718
2006			407	42	1 202	404							2 055	8 725	697	0	2 865	12 287	14 342
2007			130	85	281	334							830	4 294	1 218	0	2 497	8 009	8 839

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2] Includes Alaska

[3] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. Gendron and B. Collins (CWS), and K. Richkus (USFWS).

Table 11. Surf Scoters Harvest Estimates in Canada and the United States

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF[2]	Total	Total
1974	1 074	34	2 714	243	9 757	2 645				322			16 789	22 200	4 381	59	746	27 386	44 175
1975		52	1 422	391	15 601	10 372	360	497		51			28 746	30 300	4 207		63	34 570	63 316
1976	4 357	714	7 220	1 168	20 035	8 684	566			77	69	41	42 931	16 300	442	308	1 117	18 167	61 098
1977	1 654	655	7 501	754	17 584	7 911							36 059	22 800	2 405	528	5 502	31 235	67 294
1978	671	54	1 279	640	8 842	3 118				207	45		14 856	14 700	512		1 842	17 054	31 910
1979	1 452		3 061	203	12 279	7 909							24 904	10 200	1 013		1 591	12 804	37 708
1980	1 569		4 190	655	10 321	5 162	89			103	634		22 723	9 800	874	201	1 056	11 931	34 654
1981	1 246		6 390	191	12 827	1 532	495			293	94		23 068	22 800	1 142		1 178	25 120	48 188
1982	9 936		2 776	355	14 879	1 285	260			171			29 662	5 800	635	633	952	8 020	37 682
1983	4 748		1 079		4 118	871	351		189	74	148		11 578	5 800	709	284	1 274	8 067	19 645
1984	4 145		2 957	152	7 942	3 063	284			307	112		18 962	18 300	1 980		7 092	27 372	46 334
1985	1 377		3 678	148	6 399	593	283			66	830		13 374	18 700	1 653		723	21 076	34 450
1986	2 338	82	2 456	186	2 060	1 994				29	124	34	9 303	19 100	844	295	344	20 583	29 886
1987	570		3 031	194	6 888	2 048		130		264			13 125	18 100	790		1 529	20 419	33 544
1988	987		2 397	282	7 331	634							11 631	6 300	241	79	2 094	8 714	20 345
1989	2 626		4 803		5 070	2 896				39			15 434	15 600	957		1 215	17 772	33 206
1990	3 410		7 552	432	5 184	1 152	714						18 444	14 900	301	131	632	15 964	34 408
1991	948		1 318	476	1 821	2 097	586	514					7 760	11 400	151	128	188	11 867	19 627
1992	655		1 399		3 479	577							6 110	11 200	377	124	221	11 922	18 032
1993	1 289	94	4 916	260	3 890	915	1 124			25	35	5	12 553	8 500	694	63	807	10 064	22 617
1994	3 601		7 683	69	6 890	669						35	18 947	16 100	787	141	46	17 074	36 021
1995	2 878		4 686	592	3 448	971				34			12 609	6 600	2 916	221	777	10 514	23 123
1996	313		1 354	87	2 970	758							5 482	11 400	1 901	311	1 198	14 810	20 292
1997	325		2 694	290	3 029	442							6 780	9 700	457		2 157	12 314	19 094
1998	982	1 215	6 704	326	2 400	310					76		12 013	15 100	542	25	1 521	17 188	29 201
r 1999	2 215		4 642	120	2 836	43	285						10 144	9 300	2 900	200	2 700	12 196	22 340
2000	308		726	601	1 096	61							3 140	13 400	300	100	3 600	11 596	14 736
2001	520		806	108	1 549								2 983	26 800	300	100	1 500	13 095	16 083
2002	1 951	158	922	72	2 314	70				42			5 529	20 100	1 000	100	2 700	23 900	29 429
2003	706		1 588	15	636	349							3 294	38 500	1 100	200	400	40 200	43 494
r 2004	216		1 821		1 940	458							4 435	30 800	500	100	3 200	34 600	39 035
r 2005	1 637		731	108	176	117							2 769	21 057	1 591	0	4 272	26 920	29 689
r 2006	272		1 131	104	1 158								2 665	29 078	566	83	2 304	32 031	34 696
r 2007	86	212	741	131	1 068	202							2 440	29 033	1 691	182	6 097	37 003	39 443

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska). [2] Includes Alaska

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. Gendron and B. Collins (CWS), and K. Richkus (USFWS).

Table 12. Greater Snow Geese Harvest estimates in Canada and the United States

An unknown proportion of the U.S. harvest is comprised of Lesser Snow Geese (harvest estimates of Snow Geese are combined in the U.S.).

	Canada													**United States**[1]		**Continental**
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	Total	Total
1975					32 436		153						32 589	9 200	9 200	41 789
1976					28 866	66							28 932	12 100	12 100	41 032
1977														22 200	22 200	22 200
1978					42 763	1 312		261	351				44 687	20 100	20 100	64 787
1979					23 190								23 190	28 000	28 000	51 190
1980					59 120	103							59 223	27 300	27 300	86 523
1981			33		27 475	107							27 615	13 500	13 500	41 115
1982			50		40 697	832	178	327					42 084	21 700	21 700	63 784
1983														40 400	40 400	40 400
1984	177				45 538	624	3 243	758					50 340	37 600	37 600	87 940
1985					24 660								24 660	14 800	14 800	39 460
1986				55	11 077								11 132	8 900	8 900	20 032
1987					2 125								2 125	28 500	28 500	30 625
1988					41 827			88					41 915	24 900	24 900	66 815
1989					44 185	253							44 438	17 100	17 100	61 538
1990	294				59 223				205				59 722	21 500	21 500	81 222
1991					48 568		621						49 189	26 400	26 400	75 589
1992				295	26 988	926	761	215					29 185	10 400	10 400	39 585
1993					97 539	429	2 010	2 282					102 260	30 400	30 400	132 660
1994					35 903	112							36 015	17 600	17 600	53 615
1995			21		50 267	252	391						50 931	18 800	18 800	69 731
1996	60		62	1 859	66 111	111	115						68 318	31 400	31 400	99 718
1997					55 056	164							55 220	34 700	34 700	89 920
1998			90	412	86 791	64			118				87 475	110 900	110 900	198 375
1999[2]				774	36 821	105			86				37 786	39 100	39 100	76 886
2000					103 615			554	334				104 503	47 000	47 000	151 503
2001					94 011				68				94 079	77 802	77 802	171 881
2002				225	45 890			531	220				46 866	39 295	39 295	86 161
2003					86 028	111		213		73			86 425	35 067	35 067	121 492
2004				433	66 326	1 394		1 610	83				69 846	31 548	31 548	101 394
r **2005**					66 238								66 238	35 394	35 394	101 632
r **2006**			135		73 585	331			364				74 415	33 256	33 256	107 671
r **2007**				578	61 652								62 230	50 742	50 742	112 972

[1] AF: Atlantic Flyway. [2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. H. Gendron and B. Collins (CWS), and K. Richkus et al. (USFWS).

Table 13. Lesser Snow Geese Harvest Estimates of in Canada and the United States

In the U.S., an unknown proportion of Lesser Snow Geese are also harvested in the Atlantic Flyway and are included with the Greater Snow Goose estimates (Table 12).

	Canada													United States[1] (PF includes Alaska)				Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	MF	CF	PF	Total	Total
1975					6 545	18 075	51 180	13 159	14 911	2 625	324		106 495	167 700	350 057	92 871	610 628	717 123
1976					234	11 963	31 603	21 269	31 027	2 131	260		98 227	102 500	256 490	144 011	503 001	601 228
1977					20 695	7 012	31 006	13 061	29 709	508			101 991	126 800	306 302	81 841	514 943	616 934
1978				76	519	6 577	39 766	11 582	16 517	394			75 431	133 900	189 015	30 925	353 840	429 271
1979					5 300	9 898	98 426	13 276	11 399	1 944	552		140 243	165 600	338 391	32 628	536 619	676 862
1980			62		12 294	8 276	90 882	16 241	9 451	1 628			138 834	144 600	251 765	35 766	432 131	570 965
1981					593	6 734	87 996	14 947	14 065	3 055			127 390	110 900	289 869	61 109	461 878	589 268
1982					1 632	3 027	81 900	22 229	6 094	1 896			116 778	124 200	241 744	33 074	399 018	515 796
1983					46 188	1 502	81 880	32 584	6 932				169 086	187 300	245 748	46 829	479 877	648 963
1984					2 578	1 097	76 630	32 340	8 791	2 704			124 140	101 800	292 798	64 426	459 024	583 164
1985			50		390	2 010	103 348	33 698	11 768	4 096			155 360	99 200	216 868	82 223	398 291	553 651
1986						2 169	48 950	31 326	9 629				92 074	69 700	149 889	37 384	256 973	349 047
1987					37 803	4 845	69 524	23 320	4 091	2 122			141 705	56 400	182 585	38 236	277 221	418 926
1988					3 952	2 313	71 322	24 204	9 664	1 657			113 112	51 700	251 836	42 134	345 670	458 782
1989					1 183	5 609	92 892	26 752	11 020	917			138 373	97 300	286 271	32 955	416 526	554 899
1990				452	2 228	2 834	53 754	31 818	10 179	141	339	407	101 813	92 900	211 758	26 802	331 460	433 273
1991					2 710	2 819	65 871	22 407	5 510	2 642			101 959	110 900	249 950	30 999	391 849	493 808
1992			56		591	589	26 786	21 240	9 123	467			58 852	60 100	149 484	29 281	238 865	297 717
1993					7 649	2 543	51 314	19 674	5 304	2 094			88 578	71 800	270 235	55 293	397 328	485 906
1994					5 855	657	56 221	30 258	6 987	2 174	105		102 152	99 100	270 502	29 410	399 012	501 164
1995					855	1 286	61 603	31 323	8 680	1 589	306		105 336	191 200	331 957	37 807	560 964	666 300
1996					3 486	1 028	46 163	34 546	4 185	2 863			92 271	231 100	299 215	59 042	589 357	681 628
1997					8 853	336	69 683	62 635	9 261				150 768	239 000	348 989	35 501	623 490	774 258
1998				16	16 732	954	52 121	68 985	14 890	1 797			155 495	394 700	295 774	52 395	742 869	898 364
1999					6 747	115	14 150	116 313	15 416	1 990			154 731	317 412	487 753	51 190	856 355	1011 086
2000					5 686	1 350	31 699	68 377	12 881	2 559		128	122 680	234 699	380 158	39 039	653 896	776 576
2001					4 427	982	25 335	100 525	13 367	2 354			146 990	315 508	345 139	44 572	705 219	852 209
2002					2 699	697	24 252	85 933	9 612	7 284			130 477	197 297	268 572	46 526	512 395	642 872
2003					3 941	901	26 970	108 457	10 539	1 312			152 120	286 279	247 659	42 931	576 869	728 989
2004					82	642	23 158	76 709	3 654	1 188			105 433	192 256	216 089	40 724	449 069	554 502
2005					1 090	383	13 669	81 946	6 490	2 443			106 021	248 951	304 040	63 779	616 770	722 791
2006	131				1 349	1 122	31 936	116 278	11 430	3 170			165 416	213 274	255 995	71 479	540 748	706 164
2007					703	254	19 452	66 934	14 976	4 626			106 945	148 944	275 228	87 821	511 993	618 938

[1] MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

Data source: M. H. Gendron and B. Collins (CWS), and K. Richkus et al. (USFWS).

Table 14. White-fronted Goose Harvest Estimates in Canada and the United States

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF	Total	Total
1974															10 102	34 623	41 592	86 317	86 317
1975			281				451	45 687	14 345	389	122	142	61 295		29 282	47 621	38 485	115 388	176 683
1976							825	51 876	9 300			45	62 046		22 248	32 959	46 010	101 217	163 263
1977								43 341	15 862	82		2	59 287		18 660	49 154	35 566	103 380	162 667
1978							379	50 987	11 343	246		121	63 076		33 376	44 179	38 021	115 576	178 652
1979							101	47 200	12 092	72		247	59 712		29 119	54 655	24 395	108 169	167 881
1980							2 309	56 164	20 037	61			78 571	105	28 097	74 884	20 874	123 960	202 531
1981							1 505	36 781	14 648	303		5	53 242		94 871	80 886	22 851	198 608	251 850
1982							263	39 822	15 435				55 520	486	51 421	63 017	16 772	131 696	187 216
1983							119	46 947	5 634		570		52 700	257	61 646	51 828	17 137	130 868	183 568
1984						153	115	38 797	14 367	126		37	53 595	67	67 160	78 197	8 306	153 730	207 325
1985								37 605	12 482	277			50 364	77	46 812	51 473	15 671	114 033	164 397
1986					23		497	37 753	20 598				58 871		34 016	33 891	8 836	76 743	135 614
1987							125	36 856	11 184	84			48 249		32 148	55 016	10 962	98 126	146 375
1988								21 643	18 125	102			39 870		33 802	61 721	6 385	101 908	141 778
1989			43			45	119	34 374	18 738	48			53 367		47 655	80 462	11 479	139 596	192 963
1990	294						111	26 849	16 525	117	97		43 896		70 202	73 011	8 395	151 608	195 504
1991			51		82		549	31 649	11 540	65			43 936		72 199	54 510	11 658	138 367	182 303
1992							623	22 099	8 651	24			31 397		54 500	41 207	14 219	109 926	141 323
1993			50			171		21 822	7 016				29 059		42 000	64 830	13 839	120 669	149 728
1994								30 199	9 606	81			39 886		87 700	61 771	14 131	163 602	203 488
1995							79	45 011	14 888	42		64	60 084		68 600	60 880	13 523	143 003	203 087
1996			252			69	924	57 676	17 939	138			76 998		117 000	75 875	21 642	214 517	291 515
1997					180		296	37 326	15 009			37	52 848		122 400	59 913	27 205	209 518	262 366
1998							1 046	51 204	26 671	242			79 163		108 800	51 225	25 294	185 319	264 482
1999								47 316	15 033				62 349		111 434	114 010	29 458	254 902	317 251
2000								86 587	19 964	187			106 738		100 610	182 344	25 018	307 972	414 710
2001								61 391	31 722	81			93 194		108 928	91 438	29 307	229 673	322 867
2002							1 048	39 870	10 691			6	51 615		108 685	77 179	33 453	219 317	270 932
2003						101		49 733	15 348	86			65 268		110 611	80 017	26 153	216 781	282 049
2004							238	54 419	9 956				64 613		86 266	52 163	44 078	182 507	247 120
2005							172	55 315	19 947	130			75 564		92 956	113 663	45 167	251 786	327 350
2006					51			36 967	17 892	273			55 183		142 493	83 300	56 694	282 487	337 670
2007							992	42 467	26 300	199			69 958		176 444	111 083	64 835	352 362	422 320

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. H. Gendron and B. Collins (CWS), and K. Richkus et al. (USFWS).

Table 15. Canada and Cackling Geese Harvest Estimates (all populations combined) in Canada and the United States

	Canada													United States[1] (PF includes Alaska)					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT NU	YT	Total	AF	MF	CF	PF	Total	Total
1974													0	338 700	289 000	133 136	188 413	949 249	949 249
1975	8 185	6 407	9 140	2 872	14 126	31 525	97 586	95 037	83 734	9 423		142	358 177	357 900	330 400	172 717	181 394	1042 411	1400 588
1976	8 443	17 949	11 192	6 087	24 322	37 216	65 993	71 148	67 533	7 159	52	163	317 205	366 700	340 600	172 467	172 169	1051 936	1369 141
1977	12 578	18 788	8 693	2 179	51 269	58 611	45 426	65 402	60 894	9 088	218	127	333 055	465 900	357 600	158 871	185 209	1167 580	1500 635
1978	12 743	11 987	6 707	3 239	65 536	53 563	83 152	70 254	77 226	10 837		325	395 569	327 000	425 800	200 815	252 894	1206 509	1602 078
1979	13 494	10 827	5 830	2 141	50 816	64 036	95 291	80 354	80 252	13 337		289	416 667	296 900	325 300	185 740	187 396	995 336	1412 003
1980	10 242	19 137	8 219	2 854	49 377	74 352	74 517	93 609	100 652	16 763	497	525	450 247	474 900	316 300	187 176	187 925	1166 301	1616 548
1981	10 170	14 264	7 494	3 911	21 578	50 380	57 956	83 421	95 509	16 052		234	360 969	328 800	308 900	206 747	195 003	1039 450	1400 419
1982	11 186	13 296	5 378	2 817	25 897	69 234	74 265	86 257	94 170	13 696			396 196	383 700	290 100	213 544	206 567	1093 911	1490 107
1983	13 653	15 780	9 657	7 376	34 984	69 997	72 578	124 109	106 144	14 877		397	469 552	491 000	288 800	233 447	230 178	1243 425	1712 977
1984	13 995	13 962	6 508	3 048	22 379	63 612	88 937	94 123	97 422	15 835		270	420 091	408 900	310 400	235 786	199 428	1154 514	1574 605
1985	9 886	17 226	6 911	3 958	28 004	76 399	106 352	87 182	101 925	14 559		96	452 498	360 800	336 100	289 670	200 861	1187 431	1639 929
1986	16 829	21 970	8 785	5 677	38 877	85 310	92 206	81 626	87 528	14 836		190	453 834	413 900	337 000	212 901	147 111	1110 912	1564 746
1987	12 509	21 387	10 942	3 015	57 761	88 450	79 557	102 562	115 355	15 030	550	165	506 733	359 300	319 700	198 227	162 742	1039 969	1546 702
1988	9 380	24 906	9 671	3 374	19 922	76 755	56 679	79 879	99 787	15 146		174	395 673	268 900	446 200	240 786	163 230	1119 116	1514 789
1989	8 845	23 144	15 666	6 617	55 285	101 618	78 471	84 848	119 082	16 427	367		510 003	318 500	580 100	273 324	149 204	1321 128	1831 131
1990	6 521	25 207	6 580	7 273	52 350	97 514	73 822	95 962	121 504	14 831	96		501 564	302 000	510 400	282 879	184 871	1280 150	1781 714
1991	5 799	21 459	9 848	5 229	51 837	83 791	72 617	90 821	111 826	18 170	275	510	471 907	306 200	543 600	276 400	174 951	1301 151	1773 058
1992	6 436	11 640	4 290	5 350	27 182	79 880	57 464	81 009	91 103	15 961		154	380 469	247 400	484 300	223 610	196 798	1152 108	1532 577
1993	9 759	19 168	13 294	6 916	40 593	83 889	73 498	79 823	93 614	13 509		94	434 157	286 900	598 900	319 462	223 384	1428 646	1862 803
1994	6 924	28 216	6 935	5 820	15 879	85 233	60 302	82 753	107 925	14 072	21	140	414 199	306 400	644 400	382 799	259 035	1592 634	2006 833
1995	9 527	16 967	8 306	5 467	9 560	88 140	49 639	82 155	114 818	11 297		128	396 004	144 000	771 800	483 322	239 096	1638 218	2034 222
1996	7 503	22 451	8 758	4 470	10 822	87 781	93 437	111 467	137 440	15 477	417	82	499 688	219 400	814 800	610 074	268 314	1912 588	2412 276
1997	5 165	16 769	7 542	6 105	11 748	89 680	107 304	104 934	125 629	14 602			489 478	296 200	833 400	546 274	242 559	1918 433	2407 911
1998	9 746	23 781	10 802	6 225	16 882	109 731	94 033	136 736	104 831	18 586			531 353	330 600	738 900	672 326	272 552	2014 378	2545 731
1999[2]	5 464	32 944	12 633	6 079	38 702	100 751	68 822	146 112	137 527	16 093	25	90	565 217	342 800	813 400	493 320	234 350	1883 870	2449 087
2000	8 223	25 932	13 507	8 418	38 941	125 308	74 632	167 929	132 609	16 544			612 043	371 000	896 400	662 562	315 925	2245 887	2857 930
2001	5 553	25 136	10 554	5 615	67 763	148 705	102 034	146 829	111 751	13 076			637 016	687 904	858 422	627 052	279 469	2452 847	3089 863
2002	6 744	22 126	10 831	4 962	87 177	160 474	108 306	125 588	108 758	10 459		239	645 664	716 689	906 351	587 253	270 148	2480 441	3126 105
2003	5 004	20 983	4 915	11 245	112 807	160 197	90 183	135 123	116 844	14 353			671 654	657 910	1103 880	734 402	359 383	2855 575	3527 229
2004	4 481	15 028	5 996	6 100	75 316	148 893	92 512	135 759	134 551	8 165			626 801	633 289	952 120	535 606	322 329	2443 344	3070 145
2005[3]	5 516	16 109	5 240	6 908	104 530	155 746	118 570	139 194	148 589	11 640			712 042	774 515	928 457	621 738	331 020	2655 730	3367 772
2006	4 364	11 245	4 769	6 940	79 569	174 538	105 039	157 414	124 785	9 348			678 011	662 449	1078 650	565 467	339 099	2645 665	3323 676
2007	5 848	13 586	7 544	9 098	100 811	179 459	97 069	169 206	110 830	9 892		514	703 857	860 743	996 677	503 413	315 361	2676 194	3380 051

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway (including Alaska).

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: M. H. Gendron and B. Collins (CWS), and K. Richkus et al. (USFWS).